



CHARTERED INSTITUTE FOR
SECURITIES & INVESTMENT

Diploma in
Corporate Finance

Sources of Finance, Capital Investments and Valuations

Edition 2, February 2026



This workbook relates to syllabus
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Published by:

Chartered Institute for Securities & Investment

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Equity Capital Market (ECM)	1	1
Debt Capital Market (DCM)	39	2
Alternative Sources of Finance.	79	3
The Cost of Capital	95	4
Capital Budgeting.	131	5
Company Valuation	159	6
Derivatives and Risk Management	199	7
Glossary		
Multiple Choice Questions.		
Syllabus Learning Map.		

It is estimated that this manual will require approximately 70 hours of study time.

What next?

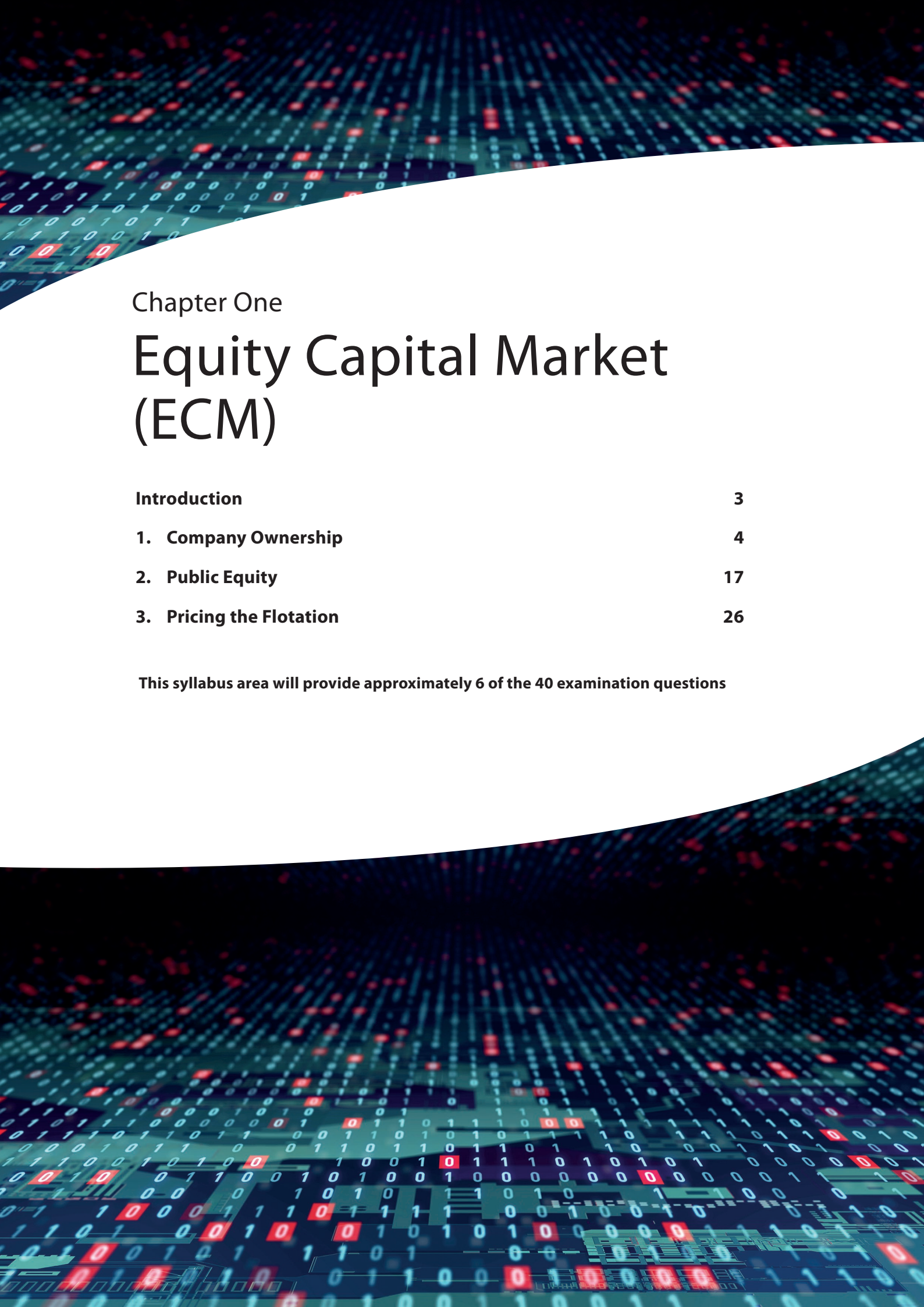
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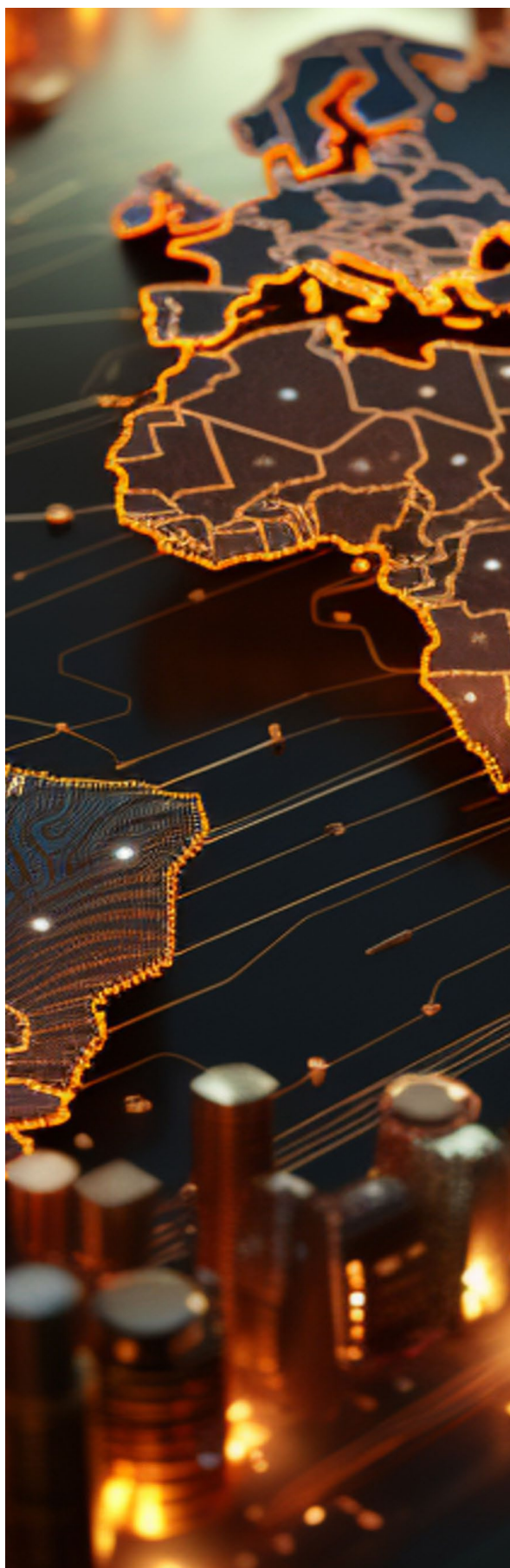


Chapter One

Equity Capital Market (ECM)

Introduction	3
1. Company Ownership	4
2. Public Equity	17
3. Pricing the Flotation	26

This syllabus area will provide approximately 6 of the 40 examination questions



Introduction

Equity capital markets (ECM) are a vital part of the financial system, providing companies with a mechanism to raise **capital** by issuing shares to investors. This chapter explores the key features of ECM, covering the types of equity securities available, their risk and return characteristics, and the process of taking a company public.

The chapter begins by introducing the main forms of equity ownership. While some companies issue multiple share classes (for example, shares with enhanced or reduced voting rights), the focus here is on the principles of share structures, particularly how ownership, voting rights and dividend entitlements are allocated. Examples such as dual-class structures, deferred shares and preference shares are used to illustrate how these arrangements affect investor protection and corporate governance.

We then consider access to international markets, including the role of depository receipts in enabling investors to hold shares in foreign companies without trading directly on overseas exchanges.

The discussion then moves to how companies make their shares publicly available. Since July 2024, the UK has adopted a new listing framework: the previous distinction between premium and standard listings has been abolished and replaced by a single category for **Equity Shares – Commercial Companies (ESCC)**. Other pathways, such as admission to AIM, remain available for smaller and growth-oriented companies.

Finally, the chapter covers the stages of an **initial public offering (IPO)** and examines different listing methods (such as offers for sale, placings, intermediaries offers and introductions). It also explores key mechanisms and shareholder protections, including the setting of offer prices, the role of overallotment or 'greenshoe' options, rights issues, pre-emption rights and share repurchases.

1. Company Ownership

Learning Objective

- 1.1.1 Know the basic characteristics of different classes of shares including the differences in ownership and voting rights.
- 1.1.2 Be able to analyse the relative risk and return characteristics of different types of shares using a range of quantitative measures
- 1.1.3 Know the characteristics of depository receipts and their use for investing in non-domestic equity securities

Shareholders are the ultimate owners of companies and, as such, bear the highest level of risk. In the event of poor company performance, the worst-case scenario entails the potential loss of their investment. Nevertheless, shareholders typically enjoy limited **liability**, meaning their financial responsibility is restricted to the amount they initially committed.

Conversely, when the company thrives, shareholders stand to gain substantial rewards. Unlike debt instruments such as **corporate bonds**, which receive fixed interest or **coupon** payments and capital repayment upon maturity, shares usually lack a predetermined return. Instead, they have the opportunity for substantial gains if the company does well.

When a company issues equity securities, it does not have a contractual obligation to repay the amount received from shareholders or to make regular payments to shareholders for the use of their funds. Instead, as mentioned before, shareholders possess a stake in the company's **assets** after settling all its obligations.

Investors who acquire equity securities pursue a return strategy encompassing capital appreciation and dividend **income**. Conversely, investors who acquire **debt securities** with the intention of holding them until maturity are primarily interested in earning interest income. Because of their ownership stake, equity investors expect that the company's management will act in their best interests by making operational decisions that enhance the market value of their shares, ultimately increasing shareholder wealth.

1.1 Ordinary Shares

Ordinary shares are often referred to as equity shares. Here, the term equity means that they have an equal right to share in the profits of the company.

Some or all of the profit made may be distributed by way of a dividend; the remainder will be retained within the business in order to increase the potential for **future** profit. The directors of the company will decide how much is distributed and how much is retained.

1.1.1 Characteristics of Ordinary Shares

The rights of ordinary shares are detailed in the company's constitutional documents and, in particular, the Articles of Association. Typical characteristics include:

1. It is normal for ordinary shares to carry the right to vote. This means that the holder of any ordinary shares may attend, speak and vote at any general meetings held by the company. While the day-to-day control and management of the company is dealt with by the directors and managers, the shareholders (as owners) must retain the right to decide upon the most important issues that affect the business.
2. The shareholders also have an equal right to share in any dividends that are distributed by the company. However, a dividend distribution is not guaranteed. If profits for the year are low, the company will be unlikely to pay a dividend. The payment of dividends is at the discretion of the directors. Note that the dividend of a UK company is paid from post-tax profits, with each shareholder's tax liability dependent on their tax status.
3. Additionally, in the event of the **winding-up** of the company, the ordinary shareholders are entitled to participate in any surplus funds available after all the creditors have been paid and preference shares have been redeemed.

1.2 Ordinary Share Classifications

1.2.1 Dual-Class Share Structures

Companies sometimes issue multiple classes of ordinary shares to separate economic ownership from voting control. This approach can be structured in different ways, but the principle is the same: insiders retain influence while raising external capital.

One common method is to give founders or senior executives shares with enhanced voting rights, often referred to as founder shares. These might carry multiple votes per share (ten or twenty votes compared to one for ordinary shareholders) ensuring that the original owners maintain control even as new capital is raised.

Another approach is to issue shares that carry limited or no voting rights. These are often labelled as 'A' or 'B' shares, though the terminology varies widely across companies and jurisdictions. In some companies, 'A shares' carry the votes and 'B shares' do not; in others, the opposite is true. The labels are therefore not universal and should be treated as examples rather than fixed definitions.

Dual-class structures are used for several purposes. They allow founders to retain long-term strategic control, which is particularly common in fast-growing technology companies. They are also sometimes used by family-owned businesses to keep control within the family while accessing outside investment. In certain cases, non-voting share classes are structured to act as takeover defences, because rights can change in the event of a change of control, making hostile bids harder to complete.

From the perspective of outside investors, these structures are controversial. They depart from the principle of 'one share, one vote' and may dilute the influence of minority shareholders. Regulators often scrutinise them carefully, since they can undermine transparency and corporate governance.

In the UK, there has been a long tradition of scepticism toward dual-class shares. Under the old premium listing regime, such structures were not permitted. However, following the FCA reforms of July 2024, dual-class structures are now allowed within the Equity Shares – Commercial Companies (ESCC) category, subject to certain conditions. These include a sunset clause limiting the duration of enhanced rights to ten years for pre-IPO institutional investors (which does not apply to natural persons).

Well-known international examples illustrate how dual-class structures work in practice. Alphabet (Google) has three share classes: Class A with one vote, Class B with ten votes (held by the founders), and Class C with no votes. Meta Platforms (Facebook) operates a two-class structure in which founder Mark Zuckerberg retains control through Class B shares carrying ten votes each. Berkshire Hathaway issues A and B shares with different economic values and voting rights, giving investors access at different price points while concentrating voting power in the original A shares. In the UK, family-controlled companies such as the Daily Mail and General Trust have historically used similar arrangements.

Example

Alphabet inc has three classes of common stock, two classes of which are traded:

Class A shares give one vote per share, are traded under the ticker GOOGL and the price at the time of writing (late November 2025) was \$320.18.

Class B shares give ten votes per share, they are not traded and are mainly held by the founders of Google.

Class C shares give no votes per share, are traded under the ticker GOOG and the price was \$320.12.

Given that, as reported in Alphabet's end of quarter 2 2025 filing, there were the following numbers of shares in issue, the control is seen to still reside with the founder members who hold a comfortable majority of the votes.

Class A shares: 5.817 billion shares with one vote per share = 5.817 billion votes

Class B shares: 0.847 billion shares with ten votes per share = 8.47 billion votes

Class C shares: 5.430 billion shares with no votes per share = 0 votes

Total votes = 14.287 billion

Proportion of votes held by the B shareholders (mainly the founders) = $8.47 \text{ billion} / 14.287 \text{ billion} \times 100 = 59.28\%$

Source: Alphabet Quarterly Filing (10-Q) June 2025

Generally, it is important to focus less on the specific labels (A or B) and more on how rights are distributed between shareholders, how control is maintained or diluted and how investor protection is affected.

Investors often approach organisations that distribute control differently from economic interests with caution. In the UK, directors are legally bound by their fiduciary duty to act in the best interests of all

shareholders. Consequently, a tiered **share capital** structure that discriminates against non-voting shareholders is viewed as contrary to this duty and is not favoured.

1.2.2 Deferred Shares

The term 'deferred' share refers to a type of share in which the typical rights of the shareholder are postponed or deferred in some manner. Usually, deferred shares come with restricted dividend entitlements and do not qualify for dividends until a specific condition is met, which is typically one of the following:

- When the ordinary dividends have reached a predetermined threshold.
- After a specific period has elapsed since their issuance.

The residual dividend paid on deferred shares is often set at a higher rate than the standard dividend. Consequently, any additional risks associated with holding deferred shares can be balanced by the prospect of increased returns.

In recent times, senior executives and directors increasingly receive deferred shares as a component of their remuneration packages. These shares are 'deferred' because they cannot be actively traded until a specified period has elapsed. If the individual departs from the organisation before the end of the vesting period, the shares are typically forfeited. This practice is aimed at incentivising key employees to remain with the company.

Additionally, deferred shares may also have subordinated rights to a company's assets in the event of bankruptcy. This means that, they are only paid out after all other ordinary and preferred shareholders have received their payments.

1.3 Preference Shares

In comparison to ordinary shares that carry the full risks and rewards of ownership, preference shares take on some debt-like characteristics and offer only limited risk and returns. The dividend on preference shares is normally a fixed dividend, expressed as a percentage of the **nominal value**. For example, 7% £1 preference shares: these shares would pay a dividend each year of 7p per share. In the UK, preference share dividends are taxed in the same way as other dividend income received.

1.3.1 Characteristics of Preference Shares

1. **Dividend priority** – preference shares have a higher claim on the company's earnings when it comes to dividend payments compared to ordinary shares. This means that if the company declares dividends, preference shareholders receive their dividends before ordinary shareholders.
2. **Liquidation preference** – in the event of a company's liquidation or bankruptcy, preference shareholders have a higher priority when it comes to the distribution of the company's assets. They are paid off before ordinary shareholders from the remaining assets.
3. **Limited voting rights** – in most cases, preference shareholders do not have voting rights in the company unless such rights are explicitly granted at the time of issuance. Ordinary shareholders typically have more influence in the company's decision-making processes.

4. **Hybrid characteristics** – preference shares exhibit characteristics of both debt securities and ordinary shares. Similar to debt securities, preference dividends are fixed and usually higher than ordinary share dividends. However, unlike debt interest payments, preference dividends are not contractual obligations and can be suspended if the company faces financial difficulties.
5. **Perpetual nature** – preference shares can be perpetual, meaning they do not have a fixed **maturity date**. They can continue to pay dividends indefinitely as long as the company remains in operation.
6. **Callable or putable** – some preference shares may have callable or putable features. Callable preference shares can be redeemed by the company at a predetermined price, while putable preference shares can be sold back to (or redeemed by) the company at a specified price by the shareholder.

Overall, preference shares provide a balance between the reliability of fixed dividends seen in debt securities and the potential for capital appreciation and voting rights seen in ordinary shares. They are often attractive to investors who seek a degree of stability in their investment returns but are willing to forgo some of the potential upside offered by ordinary shares.

1.3.2 Special Types of Preference Shares

Some preference shares can be designated as participating preference shares, which grant them the right to receive a portion of profits when certain profit thresholds are reached, instead of receiving a fixed return. This participation right may also extend to the distribution of assets during the company's liquidation.

Preference shares can also be issued with conversion rights, enabling them to be converted into a specific number of ordinary shares at a predetermined future date. In this case, preference shares resemble convertible debt instruments more than traditional shares.

Furthermore, preference shares may be assigned specific **redemption** dates. Unlike ordinary shares, which are generally not redeemable, preference shares often come with redemption dates, giving them characteristics more akin to debt instruments. However, preference shares can only be redeemed using funds from a new share issuance or distributable reserves, ensuring the company's capital base remains intact and safeguarding the interests of creditors.

One notable distinction between preference shares and debt lies in the tax treatment of the dividends. Preference dividends, as well as ordinary dividends, are paid out of the company's after-tax profits and are therefore not allowable deductions for corporation tax. Interest on debt, by contrast, is paid out of the company's pre-tax profits and is therefore an allowable deduction which reduces the company's profits for corporation tax purposes.

1.4 Return and Risk Characteristics

The various categories of equity shares possess distinct ownership stakes in a company's net assets. The nature of the equity share and its attributes determine the potential for returns as well as the level of risk associated with it.

1.4.1 Return

Equity securities generate their total returns from two primary sources: changes in price (capital gains) and dividend income. Price change reflects the difference between the purchase price and the sale price of a share during the holding period of the investment. Meanwhile, **cash** or stock dividends represent distributions made by the company to its shareholders.

For shares that do not pay dividends, the total return is solely determined by price appreciation. Early-stage companies often reinvest earnings and **cash flows** for growth which is one reason why they may not pay dividends. In contrast, mature companies with fewer growth opportunities typically return excess cash to shareholders through dividends or **share buybacks**.

For investors buying shares denominated in a foreign currency, there is a third source of return: foreign exchange gains or losses. These arise from changes in the exchange rate between the investor's currency and the currency in which the shares are denominated. For instance, an EU investor purchasing shares denominated in US dollars (USD) can see additional returns if the USD strengthens against the euro. Conversely, if the dollar weakens, this will adversely affect their overall return. Investing in shares in foreign currencies therefore adds an additional layer of volatility and risk.

Holding Period Return

When deciding on which investments to hold in a portfolio, an investor must be able to compare them directly. One measure of return that could be used for this purpose is the holding period return. The holding period return (HPR) is a measure of the total return an investor earns from holding an investment over a specific period. It takes into account both capital gains (or losses) and any income received from the investment, such as dividends or interest. The formula for calculating the holding period return is:

$$\text{HPR} = (P_1 - P_0 + D) / P_0$$

Where:

- HPR is the holding period return.
- P_1 is the ending price (or value of the investment).
- P_0 is the beginning price (or value of the investment).
- D is any income received during the holding period, such as dividends (or interest).

Here is an example to illustrate how to calculate the holding period return:

Example

Suppose you purchase 100 shares on 1 January for £50 per share and you hold the investment for one year. During that year, you receive £200 in dividends (£2 per share). At the end of the year, the stock price has increased to £60 per share.

Using the formula:

$$\text{HPR} = (P_1 - P_0 + D) / P_0 = (60 - 50 + 2) / 50 = 0.24 \text{ or } 24\%$$

So, the holding period return for this investment over the one-year period is 24%. This means that you earned a 24% return on your investment when accounting for both capital appreciation and dividend income over the holding period.

But what would happen if the holding period was for less than one year? If the above shares had been held for only six months, the HPR would still be 24%. This, however, would not reflect the fact that the shares were held for half the time. In order to make the two investments directly comparable, the returns calculated must be for a standard period. This is achieved by using the equivalent period interest rate formula to annualise the returns in cases where the holding period is for less than 12 months:

$$\text{Annualised return} = (1 + r_n)^{12/n} - 1$$

Where n = number of months and r = HPR

Hence, annualising the return achieved over the six months we get:

$$1.24^2 - 1 = 53.76\%$$

Exercise 1.1

Suppose share A cost £100 and at the end of six months returns £10 cash inflow before being sold for £110. How can it be compared with share B, bought at £50, held for one year and then sold for £70 with no income received? The different costs must be considered, as well as the different returns and time periods involved.

Solution

Share A
$$\text{HPR} = (110 - 100 + 10) / 100 = 20\%$$

Share B
$$\text{HPR} = (70 - 50 + 0) / 50 = 40\%$$

As share A was held for six months and share B was held for one year, their respective HPRs are not directly comparable. We therefore need to annualise the return for share A as it was held for less than one year.

$$\text{Share A annualised return} = 1.2^2 - 1 = 44\%$$

Share A, therefore, provided a better overall return.

1.4.2 Risk

The risk associated with any investment is linked to how uncertain its future earnings are. In general, when there is more uncertainty about future earnings, the investment becomes riskier, leading to greater fluctuations in return. In the context of equity securities like shares, because their overall return is determined by changes in their price and dividends, the risk of an equity security is essentially the uncertainty surrounding its anticipated future return.

The risk associated with an equity security is closely tied to its type and specific attributes, which in turn affect the level of uncertainty regarding future earnings. In broad terms, preference shares tend to exhibit lower risk compared to ordinary shares. One of the reasons for this is that dividends on preference shares are stable and predetermined, offering a clear outlook on future cash flows. Further, preference shareholders are entitled to receive dividends ahead of ordinary shareholders, providing an added layer of security. Also, the predetermined **par value** of preference shares in the event of company liquidation, while not guaranteed, contributes to reduced uncertainty regarding potential payouts, especially in times of financial hardship.

It is essential to note that some preference shares and ordinary shares may be more risky or less risky than their standard counterparts due to their specific features. For instance, from an investor's perspective, puttable ordinary or preference shares are less risky than callable or non-callable ones

because they provide the option to sell shares at a predetermined price. This preset price establishes a minimum payout, reducing uncertainty about future cash flows. Consequently, putable shares generally offer lower dividends.

Callable ordinary or preference shares, on the other hand, are more risky than their non-callable counterparts because the issuer can redeem them at a predetermined price. To compensate for this risk, callable shares typically offer higher dividends. Similarly, putable preference shares are less risky than non-putable ones. Cumulative preference shares are less risky than non-cumulative ones because they grant investors the right to receive any unpaid dividends before ordinary shareholders.

In addition to uncertainty of income, there are other factors that can lead to **variability** of return on an investment. These are summarised below:

Interest Rates

Changes in interest rates are liable to impact upon the future returns resulting from an investment opportunity either through impacting on:

- the returns that are paid, or
- the market value at the end of the period.

For example, increased interest rates tend to have an adverse impact on a company's trading performance, as more profits are consumed in servicing any debt financing. Of course, the opposite is true for net lenders.

In addition, increased interest rates will usually increase investors' required rates of return, reducing the market values of both equity and debt investments.

Inflation

Inflation may have two effects on any investment opportunity. Inflation may:

- increase the nominal cash flow returns from the investment, or
- increase the investor's required rate of return.

Exchange Rates

Governments often use interest rates as a tool to influence exchange rates. When a country's interest rates are high compared to others, its currency becomes more attractive to investors. This increased demand for the currency leads to a stronger currency.

From a business perspective, a stronger domestic currency can have mixed effects. It makes imports cheaper for local companies, potentially boosting their profits. However, it can also make the products they export more expensive for foreign buyers, which might lead to lower profits for exporters.

Moreover, when a country's currency strengthens against others, international companies with overseas subsidiaries may see a drop in the reported value of assets and profits in their home currency. This is because assets and profits denominated in foreign currencies 'lose value' when expressed in the stronger currency.

Lastly, some currencies may be subject to exchange controls, which limit their convertibility into foreign currencies. This can trap capital and profits within a specific country, posing an additional challenge in managing exchange rate risks.

Tax Rates

An increase in tax rates due to tight fiscal policy by a government will have the effect of reducing the returns from any investments (unless they are tax free). This means that share prices will probably fall as increased corporate tax as well as increased personal tax reduce investors' returns.

Economic Situation

The overall economic conditions, which can range from a boom to a recession, are expected to influence the demand for company products and subsequently impact the movement of equities. Whether stocks rise during a boom or decline in a recession depends on the prevailing economic climate. In most cases, it is the anticipation of future economic conditions that exerts an influence on current prices.

1.4.3 Calculating Expected Return and Risk

Various methods are available to estimate a share's **expected return** and risk. One approach relies on historical return averages and their **standard deviations** as indicators of future return and risk. Alternatively, you can estimate a range of future returns, assign probabilities to each outcome, and then calculate the expected return and its standard deviation based on this data.

Exercise 1.2

The shareholders in an ungeared company have a required rate of return of 10% per annum. The company can invest £100 in a one-year project, for which the holding period returns are expected to fall within the following range of possibilities.

Probability	Return
%	£
25	100
45	110
30	120

Should the investment be undertaken?

Solution

First, calculate the expected rate of return as follows:

Probability %	Return %	Expected %
25	0	0.0
45	10	4.5
30	20	6.0
	Expected return =	10.5

On the basis that the expected return is 10.5% and the required rate of return of the shareholders is 10%, we may be tempted to believe that the investment should be undertaken. The problem is that while returns considerably in excess of 10% could occur, there is also a possibility that returns could be considerably below 10%.

This variability is the risk that we face and in deciding on any investment we have to cope with the fact that there is a range of possible outcomes.

In determining their required return from the company of 10%, the shareholders will have taken account of the risk that they expect to face from its current operations, ie, the variability of the current returns. However, that is unlikely to be identical to the risk from this project; hence the 10% cost of capital may not be appropriate. If the project is riskier, the investors would require a higher return, as we noted above.

Thus, we need to quantify the level of risk involved.

Variance and Standard Deviation

To measure the degree of variability or 'risk' of an investment (i), we normally use either:

- the **variance** (σ_i^2), or
- the standard deviation (σ_i),

where each possible return E_r occurs with probability p and the expected return is denoted by $\bar{E}_r$.

The variance is the expected value of the squares of the deviations of possible returns about the expected return $\bar{E}_r$. The standard deviation is the square root of the variance.

As a result, each summarises, as a single figure, the variability of the return (either up or down) about the expected return.

The standard deviation has the benefit that it is expressed in the same units as the returns (percentage (%)) in the example above), whereas the variance is in the original units squared. The standard deviation can be thought of as the average deviation from the expected value (although, mathematically, it is the square root of the average of the squared deviations from the expected return or mean).

Other single measures could be calculated, for instance, by only looking at variances below the expected value, but none is as widely used as variance and standard deviation.

Exercise 1.3

From exercise 1.2 above, determine the expected return and standard deviation.

Solution

Probability (p)	Return E_r	Expected Value	$E_r - \bar{E}_r$	$(E_r - \bar{E}_r)^2$	$p(E_r - \bar{E}_r)^2$
%	%	%			
25	0	0.0	-10.5	110.25	27.5625
45	10	4.5	-0.5	0.25	0.1125
30	20	6.0	+9.5	90.25	27.0750
Expected return ($\bar{E}_r$) =		10.5	Variance (σ_i^2) =		54.7500

Variance of returns (σ_i^2) about $E_r = 54.75$

Standard deviation of returns $\sigma_i = \sqrt{54.75} = 7.399\%$

Generally, the higher the standard deviation, the greater the variability of returns and the greater the risk.

1.5 Investing in Non-Domestic Equity Securities

Investors have multiple avenues for investing in non-domestic or foreign equities, with the most straightforward being direct buying and selling in foreign markets. However, this approach involves conducting all transactions, including share transactions, dividend disbursements and capital gains in the company's native currency rather than that of the investor.

Alternatively, investors can opt for securities like depository receipts and global registered shares that represent ownership in international companies but are traded on domestic exchanges in domestic currencies. These securities alleviate concerns related to currency conversion as price quotes and dividend payments occur in the investor's domestic currency.

1.5.1 Depository Receipt (DR)

A depository receipt (DR) is essentially a security that behaves much like a regular share but is traded on a foreign exchange. It represents an ownership stake in a foreign company and provides a means for that company's publicly traded shares to be traded on an exchange outside its home country. The process of creating a depository receipt involves depositing the equity shares of a foreign company into a bank (called the depository) situated in the country where the shares will be traded. Once these shares are deposited, the depository issues receipts that essentially stand for the shares that were placed in its custody.

The depository bank that issues these receipts has several responsibilities, including acting as a custodian and registrar. This involves managing dividend payments, handling other taxable events, accommodating stock splits and serving as the transfer agent for the foreign company whose securities the depository receipt represents. Some major depository banks include The Bank of New York Mellon, Deutsche Bank, JPMorgan, and Citibank.

The number of these DRs issued and their individual prices are determined by a specific ratio, indicating how many depository receipts correspond to the underlying shares. Consequently, a single DR may represent a whole share of the original company, multiple shares or even a fraction of a share of the original company. The price of each depository receipt is influenced by various factors that also impact the price of the underlying shares, such as the financial health of the company, prevailing market conditions and fluctuations in exchange rates.

Moreover, when there are temporary differences in the valuation of shares traded on multiple exchanges, it creates an opportunity for traders to engage in arbitrage and make quick profits.

American Depository Receipt (ADR)

An American Depository Receipt (ADR) is a financial instrument representing ownership in a foreign company's shares traded on a US exchange and denominated in US dollars. ADRs make it easier for US investors to invest in foreign companies without having to directly purchase shares on foreign stock exchanges. These receipts are issued by US depository banks, and they represent a certain number of shares in the foreign company.

Global Depository Receipt (GDR)

A Global Depository Receipt (GDR) is typically issued by a depository bank located outside the company's home country and outside the US.

GDRs serve a similar purpose to ADRs in that they make it easier for investors from different countries to invest in foreign companies. They provide a way for foreign companies to access global **capital markets** and raise funds from investors outside their home country. GDRs are especially popular among companies from emerging markets looking to attract international investment.

1.5.2 Global Registered Shares (GRS)

A Global Registered Share (GRS) is a type of equity security that represents ownership in a company and is typically traded on stock exchanges around the world. GRSs are similar to traditional ordinary shares but are designed to facilitate international trading and ownership.

Key characteristics of GRSs include:

1. **Ownership rights** – holders of GRSs have the same ownership rights and privileges as holders of the company's ordinary shares. This includes the right to vote at shareholder meetings and receive dividends.
2. **Global trading** – GRSs are intended to be traded on multiple stock exchanges globally, allowing investors from different countries to buy and sell them. This global trading aspect makes it easier for companies to attract a diverse set of investors.
3. **Denomination** – GRSs are often denominated in a major currency like US dollars or euros making them more accessible to a broader range of investors.
4. **Custodian banks** – to facilitate trading and ownership, GRSs are typically managed and held by custodian banks which handle the administrative and logistical aspects of GRS transactions.
5. **Regulation** – GRSs are subject to regulatory requirements and disclosure obligations in the countries where they are listed for trading providing transparency and oversight for investors.

2. Public Equity

Learning Objective

- 1.2.1 Understand the difference between an Equity Shares – Commercial Company (ESCC) listing, and an admission to AIM
- 1.2.2 Know the key stages of an initial public offering (IPO)
- 1.2.3 Understand the advantages and disadvantages of bringing securities to listing via offer for sale, placing, intermediaries offer, introduction

When a new company is formed, one of the aspirations of the founders may be for the company to seek a stock market listing in the future. In reality, very few companies ever actually come to the market and it is important to consider the reasons why a listing may or may not be appropriate.

2.1 Advantages of a Listing

Obtaining a stock exchange listing offers several advantages for a company, including:

1. **Access to capital** – one of the primary benefits of going public is the ability to raise capital by issuing shares to the public. This infusion of funds can be used for various purposes such as funding growth, paying off debt or investing in research and development.
2. **Liquidity for existing shareholders** – going public provides an opportunity for existing shareholders, including founders and early investors, to sell their shares and realise their investments. This liquidity can be especially beneficial for early investors looking to exit their positions.
3. **Enhanced visibility and credibility** – being listed on a stock exchange can increase a company's visibility and credibility in the eyes of investors, customers, suppliers, and partners. It can signal that the company has met certain regulatory and financial standards.
4. **Currency for mergers and acquisitions** – publicly traded shares can be used as a valuable currency for acquiring other companies. This can facilitate mergers and acquisitions by offering a means to pay for acquisitions without using cash.
5. **Employee incentives** – publicly traded companies often use share-based compensation, such as stock options to attract and retain top talent. This can be an effective way to incentivise employees and align their interests with those of the company's shareholders.
6. **Valuation and benchmarking** – a publicly traded company's stock price provides a regular valuation benchmark. This can be useful for assessing the company's performance and comparing it to peers in the industry.
7. **Diversification of shareholder base** – going public can help diversify a company's shareholder base by attracting a wider range of investors, including institutional investors, eg, **pension funds**.
8. **Exit strategy** – going public can be an exit strategy for early investors and founders who want to monetise their investments and realise gains. It also provides an exit option for **private equity** firms and venture capitalists that have invested in the company.
9. **Brand recognition** – listing on a stock exchange can enhance a company's brand recognition and reputation, which can be valuable in attracting customers and partners.
10. **Regulatory framework** – public companies are subject to regulatory oversight and reporting requirements. This can provide a structured framework for corporate governance and financial transparency.

2.2 Disadvantages of a Listing

There are many advantages to obtaining a stock exchange listing but it also comes with certain disadvantages and challenges including:

1. **Costs and regulatory compliance** – public companies face significant costs associated with regulatory compliance and reporting requirements. They must adhere to strict financial reporting standards, including regular disclosure of financial results, which can be expensive and time-consuming.
2. **Increased disclosure** – public companies must disclose sensitive information about their operations, financials and strategy, which competitors can access. This level of transparency can expose the company's strategic plans to competitors.
3. **Short-term focus** – public companies often face pressure from shareholders, including institutional investors, to deliver strong quarterly results. This focus on short-term performance can sometimes detract from long-term strategic planning.

4. **Market volatility** – publicly traded shares are subject to market **volatility**, which can lead to significant price fluctuations. This can make it challenging for management to focus on executing the company's strategy without being distracted by short-term share price movements.
5. **Activist investors** – public companies are vulnerable to activist investors who may push for changes in corporate strategy, management or governance. These investors can disrupt the company's operations and create uncertainty.
6. **Risk of hostile takeovers** – being publicly traded can make a company more susceptible to hostile takeover attempts as potential acquirers can accumulate shares in the open market.
7. **Management distractions** – public companies often spend significant time and resources dealing with shareholder relations, regulatory compliance and corporate governance matters, which can divert management's attention from core business operations.
8. **Risk of litigation** – public companies face a higher risk of shareholder lawsuits and regulatory investigations which can be costly to defend and may damage the company's reputation.
9. **Loss of control** – founders and early investors may experience a loss of control over the company as ownership is spread among a larger number of shareholders.
10. **Market pressure for growth** – public companies are often expected to demonstrate consistent growth in revenue and earnings. Failing to meet these expectations can result in a negative market response.

It is important for companies considering going public to weigh these disadvantages against the advantages and carefully evaluate their readiness and long-term strategic goals. Going public is a significant decision that requires thorough planning and preparation to mitigate potential downsides. Some companies may opt to remain private or explore alternative financing options to avoid the challenges associated with a stock exchange listing.

2.3 Equity Shares – Commercial Companies (ESCC) Listing

Until July 2024, the **London Stock Exchange (LSE)** offered two main types of listings on its Main Market: the standard listing and the premium listing. These categories differed in the governance, disclosure and reporting obligations placed on companies. A standard listing required only the minimum criteria set out in UK legislation and EU-derived rules, whereas a premium listing required companies to adopt higher corporate governance and transparency standards, including compliance with the UK Corporate Governance Code. Premium listed companies were also eligible for inclusion in major indices such as the FTSE 100 and FTSE 250, while standard listed companies were not.

The premium category imposed prescriptive requirements. Companies had to demonstrate a minimum three-year trading record, maintain a free float of at least 25 per cent of shares in public hands and provide extensive historical financial information. They were also subject to mandatory shareholder votes for certain matters, including Class 1 significant transactions, related-party transactions, discounted share issues above set thresholds and any proposal to cancel the listing. In contrast, companies with a standard listing faced only the baseline requirements of EU/UK law and enjoyed greater flexibility, but this often made them less attractive to institutional investors.

This two-tier framework has now been replaced by a new, single category known as Equity Shares – Commercial Companies (ESCC). The reform was part of the Financial Conduct Authority's (FCA) Primary Markets Effectiveness Review and came into effect in July 2024. Its purpose was to simplify the UK listing regime and make London a more attractive market for new issuers, particularly fast-growing and founder-led companies, while maintaining appropriate standards of investor protection.

Under the ESCC rules, companies no longer choose between standard and premium categories. Instead, all issuers of equity shares in commercial companies are admitted to the ESCC category and must comply with a single set of requirements. These requirements are designed to strike a balance between flexibility for issuers and protections for investors.

For example, ESCC companies must publish audited annual financial statements and half-yearly reports, but some of the prescriptive obligations that previously applied only to premium listings have been relaxed or replaced with a disclosure-based approach. Instead of requiring mandatory shareholder approval for every significant or related-party transaction, companies now disclose details of these events, giving investors the transparency needed to make their own judgements without unduly slowing corporate activity.

In terms of governance, ESCC companies are expected to report against the **UK Corporate Governance Code**. However, compliance is no longer a condition of eligibility for listing as it was for premium listed companies. Instead, companies adopt a 'comply or explain' disclosure model, allowing flexibility for newer or founder-led companies while ensuring that investors have visibility over governance arrangements.

Importantly, the ESCC framework also permits certain features that were not allowed under the old premium listing regime. A key example, as previously mentioned, is the acceptance of dual-class share structures, subject to the sunset period of ten years for pre-IPO institutional investors.

Companies admitted to the ESCC category remain eligible for inclusion in the FTSE UK indices provided they meet the index provider's criteria. This continuity ensures that institutional investors, including index-tracking funds, continue to participate in the UK market.

So while the standard and premium listings are important historically, they no longer exist for new applicants. All commercial companies now fall under the ESCC category. When the FCA reforms came into force in July 2024, companies already listed were mapped into new categories automatically. Companies that previously held a premium listing were transferred into the ESCC category, since their standards already aligned closely with the new framework. By contrast, companies with a standard listing were placed into a new Transition category, which allows them to continue trading under their existing obligations but without the enhanced disclosure features of ESCC. These companies may later apply to move into ESCC if they meet the requirements, particularly if they wish to benefit from greater investor visibility and eligibility for FTSE index inclusion.

Transition companies are essentially 'grandfathered' standard-listed firms that do not meet the enhanced disclosure and governance requirements of ESCC. They can continue trading under their lighter regime, but they:

- do not have to report against the UK Corporate Governance Code
- do not have to publish half-yearly reports

- are not bound by the ESCC's enhanced disclosure rules on major transactions, and
- are not eligible for FTSE UK index inclusion.

The Transition category is closed to new entrants; only companies that were previously standard-listed were mapped into it.

2.4 AIM

AIM, formerly known as the Alternative Investment Market, is a sub-market of the London Stock Exchange (LSE) that provides a platform for smaller, growing companies to raise capital and access public equity markets. It was launched in 1995 as a response to the need for a more flexible and less regulated market compared to the main market of the LSE.

AIM offers smaller and growing companies the opportunity to raise capital by issuing shares to investors. This capital can be used to fund expansion, research and development, acquisitions or other growth initiatives.

Compared to the main market of the LSE, AIM which is regulated by the LSE, imposes lighter regulatory requirements on companies. This flexibility makes it easier and less costly for smaller companies to access public markets.

A distinctive feature of AIM is that each company must retain a Nominated Adviser (Nomad), who is responsible for assessing its suitability for admission and ensuring ongoing compliance with the AIM Rules. This Nomad-led regulatory model allows the LSE to operate AIM with lighter rules than the FCA-regulated main market, while still providing oversight.

AIM is particularly attractive to growth-oriented companies, including startups, early-stage businesses and those seeking to expand rapidly. These companies may not meet the stringent criteria for listing on the main market but can access capital and raise their profile through AIM.

AIM provides investors with opportunities to invest in smaller, potentially high-growth companies. While investing in AIM companies carries higher risk due to the smaller size and sometimes limited track record of these companies, it also offers the potential for higher returns.

It should be noted that AIM companies are not included in major equity indices like the FTSE 100 or FTSE 250, which primarily consist of larger and more established companies listed on the main market of the LSE.

2.5 Key Stages of an Initial Public Offering (IPO)

- **Appoint advisers** – key advisers to appoint are:
 - **Sponsor** – the sponsor will frequently be an investment bank and will coordinate the flotation as well as advise on complex issues.
 - **Broker** – the broker will advise on pricing, timing and market conditions, assist in representing the issuer with potential investors, give guidance on the most appropriate method of marketing the issue, advise on the **Financial Conduct Authority (FCA)**, stock exchange and any other relevant requirements and ensure that the market for the shares is liquid.

- **Reporting accountant** – the reporting accountant will carry out **due diligence**.
- **Lawyer** – the lawyer carries out the legal due diligence on the company, reviews the issuer's legal status, reviews service contracts, re-registers the issuer as a public company if necessary, completes the document verification process and prepares all other relevant legal agreements. Separate lawyers would normally represent the directors of the company, the issuer and the advisers to the issuer.
- **Public relations** – public relations will advise on the selling of the issue to investors, liaise with the press and analysts and ensure that the marketing tone of any documents is appropriate.

The importance of each of the advisers and the specific role that they adopt will depend on the nature and size of the company to be floated. For example, in a relatively small flotation, the broker can act as the sponsor, lead underwriter and overall coordinator of the listing. Alternatively, a firm of accountants or lawyers may take on a more central role.

- **Planning** – this involves preparing a detailed timetable, lists of key documents required, potential problem areas and clear allocation of responsibilities.
- **Consultation with regulators** – this must be at an early stage, to fix the timing and level of disclosure required and to confirm suitability for listing.
- **The long form report** – the responsibility of the accountants. This is a very detailed document covering every aspect of the company, its finances and its operations. It will be used by the sponsor to assist in their assessment of the company's suitability for listing and will also be used as a base for much of the information in the **prospectus** or listing particulars.
- **Draft documents** – the main documents to be prepared are the long form report, draft prospectus, working capital letter, responsibility letters and derogation letters. The purpose of the derogation letters is to obtain permission from the regulators to omit certain specified information from the prospectus and other documents.
- **Verification** – this is the process of checking on a line-by-line basis that all statements made in the prospectus are fair, accurate and complete, ensuring that the directors have fully discharged their legal responsibilities in respect of the prospectus.
- **Completion meeting** – this is the final meeting when all documents are signed and the final decision to float is taken.

The following table provides an indicative timetable for a listing for a company.

Application for Listing – Summary Timetable	
Time Before Listing	Action
24 weeks	Appoint advisers Planning Consult regulators (FCA) Commence long-form report
	↓

Application for Listing – Summary Timetable	
Time Before Listing	Action
8 to 12 weeks	Draft documents prepared Drafts submitted to FCA Public relations campaign starts
	↓
1 to 6 weeks	Draft prospectus Verification Formal submission of documents to FCA
	↓
Final week	Approval of documents by FCA Completion meeting Underwriting agreement signed Investment presentations Allocation lists open and basis of allocation is announced Formal application for listing Listing granted Dealing commences

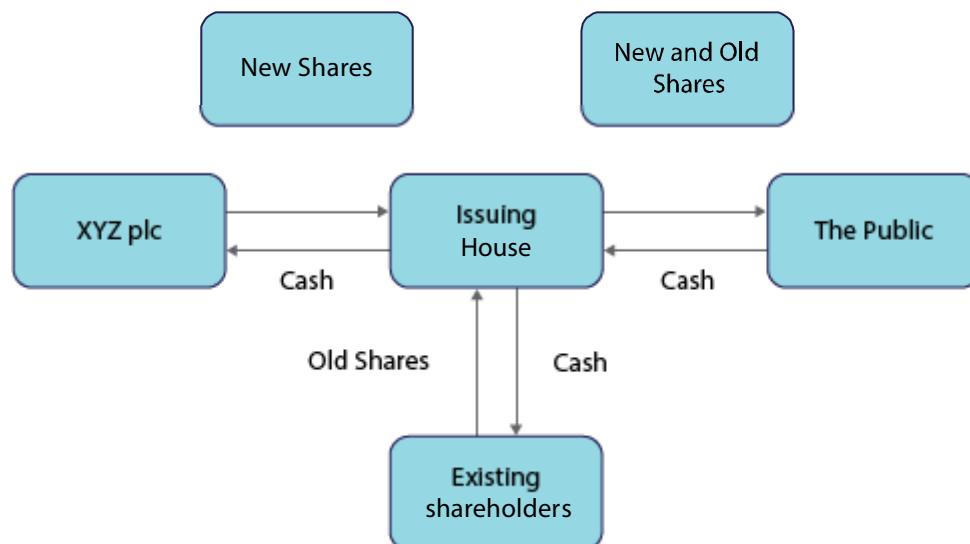
2.6 Methods for Bringing Securities to Listing

2.6.1 Offer for Sale

In an offer for sale, the company issues shares to an issuing house (typically an investment bank), which then offers the shares for sale to the retail investing public. These may be shares newly issued by the company, to raise finance for the company, or they may be shares originally held by the existing shareholders, being sold to allow them to realise some of their investment.

The offer for sale can be represented diagrammatically as follows.

Offer for Sale

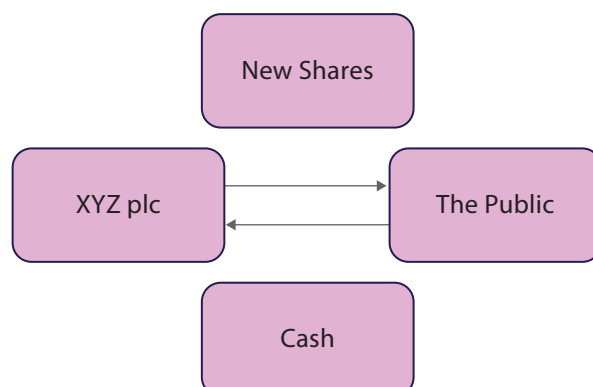


2.6.2 Offer for Subscription

An offer for subscription is similar to an offer for sale of newly issued shares, but in this case, the company issues new shares to new shareholders directly, in response to the applications for these shares.

This method is most typically used by investment companies. The requirements concerning offers for sale and subscription are the same. It can be represented diagrammatically as follows.

Offer for Subscription



2.6.3 Placing

It is very common for an offer to be made by a **placing**. A placing involves the selective identification of interested investors from among the issuing house's institutional **clients** and contacts. Securities are then marketed to this smaller number of larger investors. A placing may be represented as follows.

Placing



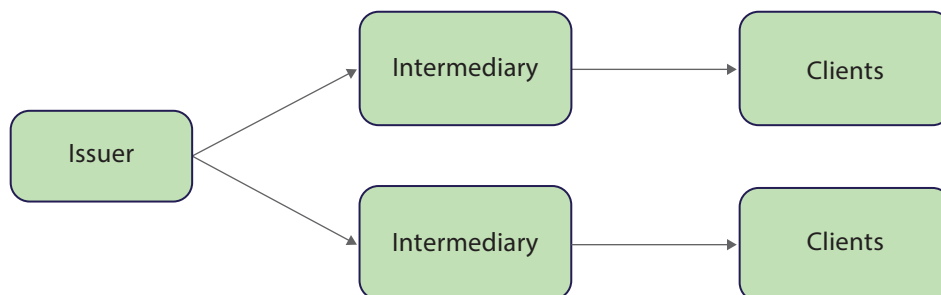
The main advantages of a placing for the company are:

- **Cost** – the placing method is far cheaper than the offer for sale since it involves selling the shares to a limited number of investors rather than having to undertake a widespread general marketing and advertising campaign. In addition, the ongoing costs of maintaining and servicing a share register with a large number of small shareholders will be substantially more.
- **Targeting of investors** – the placing gives the company the opportunity to target an appropriate investor base and to select its shareholders more carefully.
- **Speed** – the placing may be carried out much more quickly than a public offering.

2.6.4 Intermediaries Offer

An intermediaries offer is where the shares are offered only to intermediaries, such as stockbrokers, who apply to subscribe for shares on behalf of their own clients for onward sale to them. It is somewhat quicker and cheaper for the issuer than an offer for sale, but gives more opportunity for the public to participate than with a placing. It can be represented diagrammatically as follows.

Intermediaries offer



2.6.5 Introduction

Offers for sale/subscription, placings and intermediaries offers are all marketings of shares in that the company or the selling shareholders receive cash in exchange for shares. Where an issuer is not seeking to raise cash, it may elect to come to the market through an introduction. This does not involve

marketing, since no new shares are issued. All that happens is that existing shares continue to be owned by the existing shareholders but are 'introduced' to trading on a **recognised investment exchange (RIE)**, such as the LSE.

To ensure sufficient liquidity in the shares, the FCA will therefore only allow an introduction to be used as a means of achieving a listing if the securities are of such an amount and are so widely held that they will be marketable when listed. A shareholder statement confirming this must be submitted to the FCA.

Examples of situations where this may be appropriate include:

- a large, perhaps employee-owned, private company that has a substantial shareholder base
- a demerger, where one listed company distributes shares in a major **subsidiary** to its own existing shareholders and seeks a listing for that subsidiary
- an overseas company which already has a listing overseas and wishes to access the UK markets, and
- an AIM-traded company seeking to move to the Main Market.

3. Pricing the Flotation

Learning Objective

- 1.2.4 Know the various ways in which the offer price for shares in an IPO may be set
- 1.2.5 Understand the use of a 'greenshoe' option when issuing shares
- 1.2.6 Know the procedure for a rights issue and the rights of shareholders in relation to rights issues and open offers
- 1.2.7 Understand the meaning of the term pre-emption rights and the circumstances under which these can be disapplied
- 1.2.8 Know the general rules and accounting requirements when a company engages in a share repurchase

The offer price may be set in either of the following ways.

3.1 Fixed Price or Tender Offer

A fixed price offer is where the price per share is fixed by the company in advance of the offer and the public is invited to subscribe at that price. A tender offer is where the public is invited to tender for shares, offering whatever price they think is appropriate subject to a minimum tender price set by the company. The company will set a strike price for the offer based on tenders received and all successful applicants will pay the same strike price. Investors who tendered at higher prices will receive preference.

Illustration

XYZ plc wishes to issue 1,000 shares by way of tender and sets a minimum tender price of £2.00 per share. The following tenders are received.

Tendering Investor	No. of Shares Tendered for	Price per Share
A	500	£4.00
B	700	£3.00
C	700	£3.00
D	600	£2.00

XYZ plc could theoretically set the strike price at £3.00 per share, issue 500 shares to A and 250 shares each to B and C at this price, with no shares being issued to D. In practice, the price may be set at below £3.00, say at £2.90, in order to stimulate trading in the after market.

The advantages and disadvantages of each method can be compared as follows.

Fixed Price	Tender
Certainty of price	Uncertain price
Easier for private investors to understand	Harder for the private investor, but no problem for professionals
More difficult to price	Price is set by the market
Stagging is possible. (The sale of shares acquired in an IPO within a short period after listing. Also known as flipping.)	Less scope for stagging

Overall, if the company and its existing investors wish to achieve wide share ownership and to appeal to the public in general, the fixed price offer is likely to be the better alternative. If the company wishes to target its investor base more carefully and to ensure that it issues shares so as to obtain best value for existing shareholders, the tender approach is likely to be superior.

3.2 Bookbuilding

The bookbuilding approach is, to some extent, a merging of the two above methods, the fixed price offer and the tender. It is especially relevant for very large issues of securities that would be difficult to underwrite because of their size. The idea of bookbuilding is that the issuing house gauges demand for the issue prior to setting a fixed price for the offer. Investors are asked to indicate, either on a firm or uncommitted basis, the best price that they will offer and the maximum number of shares that they will buy at particular prices. This information enables the issuing house to build up a demand curve and establish the most appropriate offer price for the issue.

The advantages of using bookbuilding are that it can build up creative tension and increase demand for the shares and the final issue price. It is highly suitable for large issues where **underwriting** would not be possible due to the size of the risk to which the underwriters would be exposed. It is already well established as a technique in the US and, now that it has been used successfully in a large number of issues, has become accepted in the UK.

The technique does have potential problems. While creative tension may drive the issue price up for a popular share, there is the possibility that investors will all wait to see what others do, particularly with a doubtful issue and uncertain markets. If no one is prepared to take a lead, then the issue may never get off the ground. In addition, it is possible for investors to sell the stock short (short selling is a trading strategy where an investor sells a financial asset they do not own, with the expectation that its price will fall, allowing them to buy it back at a lower price and profit from the difference) prior to the issue in an attempt to drive the price down for the **new issue**. After the issue, the shares can be repurchased at a lower price.

In order to combat these problems, the issuing house must do the following:

- Establish an anchoring marketplace to get the issue off the ground.
- Have a sophisticated computer system to enable global demand to be accurately tracked on an instantaneous basis.
- Have in place detection techniques to identify sellers of the stock prior to the issue. This will require good relations with market participants so that all sellers can be identified.
- Have the muscle to punish institutions that sell short in the above fashion.
- Have the ability to stabilise the after market, possibly by use of call options on a tranche of shares. This is often referred to as a greenshoe option (described below).

3.3 'Greenshoe' Option

A greenshoe option (or over allotment option) arises where there is an overallocation of shares into the market by the issuing house, typically representing around 15% of the whole issue. This creates a short position for the issuing house. To manage this risk, the issuing house holds a call option granted by the company, allowing it to purchase the additional shares at the offer price if required. If the share price in the market falls, the issuing house will close its short position by buying shares in the market, hence increasing demand and stabilising the price. If the share price rises, the issuing house will exercise its call option, buying additional shares from the company. In this case, no **stabilisation** takes place and the company has actually issued more shares into the market.

3.4 Rights Issues

A rights issue is an offer to existing shareholders to subscribe for new shares in the company in proportion to their existing shareholdings. Shareholders have the right, but not the obligation, to acquire new shares or to sell their entitlement to the shares.

3.4.1 Procedures for a Rights Issue

Initially, shareholders are sent a circular which provides full details of the rights issue and the issuer's proposals (for example the number of new shares, subscription price, timetable, renunciation rights and the proportional entitlement of existing shareholders). Where required under the prospectus regime, such as when the issue exceeds the thresholds applicable under the Prospectus Regulation Rules, a prospectus must also be published. Under the new regime being introduced by the Financial Conduct Authority (FCA) effective January 2026, the threshold for further issues of securities by an already-listed issuer at which a prospectus will be required is being raised from 20% to 75% of existing share capital (and up to 100% for closed-ended investment funds).

The circular must comply with UKLR 10 (Contents of Circulars – Equity Shares (Commercial Companies)) and must not be circulated until it has been approved by the FCA under UKLR 10.2R (Approval of Circulars). The circular is accompanied by a **provisional allotment letter (PAL)**, setting out each shareholder's entitlement to the new shares in proportion to their existing holding.

A PAL is a temporary document of title. This means that until definitive share certificates are produced, this letter is proof of the shareholder's entitlement to the new shares. It is renounceable, which means that the shareholder may renounce their entitlement by selling it to someone else. In practice, the holder of the renounceable letter has a number of options as below:

- **Take up the rights to subscribe** – in this case, they pay the company for the new shares and receive a receipted PAL in exchange. They may then either continue to hold this PAL until definitive share certificates are issued, or sell the receipted PAL to another shareholder, who will then notify the issuer of their right to claim the definitive share certificate instead.
- **Without paying for the new shares, simply sell the PAL to a third party** – this results in the sale of the rights to subscribe at the set price to that third party; it is then up to the third party to take up the rights issue, pay for the new shares and notify the issuer of their right to receive the definitive share certificates. This is referred to as selling the rights 'nil paid'; the FCA may grant a listing for the securities in nil paid form.
- **Do nothing** – in this case, the company must sell the rights shares attached to the letter in the marketplace for the best price possible, or place them with underwriters. Any premium achieved over the subscription price is then remitted to the person to whom the rights related and who received the PAL. However, if the surplus is very small (£5.00 or less), the company need not send it to the shareholder, but can retain it for the benefit of the company.

3.5 Open Offers

An **open offer** is a pre-emptive offer, which is not allotted on renounceable documents. This means that although shareholders are offered shares on a pre-emptive basis, they cannot sell on the right to subscribe for the open offer shares, unlike in a rights issue.

3.6 Pre-emption Rights

Section 561 of the Companies Act 2006 states that where a company issues shares for cash, then it is obliged to offer them first to existing shareholders on a pro rata basis to their existing holding in the company. The shareholders must be given at least 21 days to decide whether to purchase the shares. If they do not, then the shares can be sold to outsiders, but the price must not be better than that offered to existing shareholders.

The objective of this law is to protect the interests of existing shareholders and prevent shares in the company being issued by the directors to new shareholders, possibly at cheap prices, thus diluting the existing shareholders' interests.

A private company is able to exclude the requirement for these pre-emption rights in its Memorandum and Articles if it so desires. However, it is often the case that private company Memorandum and Articles contain even more stringent rules about share issues and transferability of shares than a listed company. In terms of public companies, the shareholders may pass a special resolution disapplying pre-emption rights for a maximum period of five years, under the Companies Act 2006 and the Listing Rules. Where an overseas company has a UK listing but does not have to follow pre-emption rights in its own country, the FCA relaxes the requirement to give pre-emption rights to shareholders.

3.6.1 Arguments for Pre-emption Rights

Pre-emption rights are a right enshrined in UK statute. The arguments for their existence are rooted in the following principles:

- Existing shareholders have the right to decide what happens to their ownership of a company, not the directors.
- Issue of shares to new investors will be at a discount to market price, to encourage them to subscribe. This means that shares will be sold on the cheap, resulting in a transfer of value from old to new shareholders.

3.6.2 Arguments Against Pre-emption Rights

In contrast to the UK, very few other countries have pre-emption rights for existing shareholders. The arguments in favour of not having pre-emptive rights for existing shareholders include:

- Pre-emption rights continue to maintain the dominant influence of UK institutions over companies listed in the UK.
- Pre-emption rights can prevent companies from increasing their shareholder base. An increased shareholder base should result in greater marketability and liquidity for the shares, increasing their price.
- Companies with pre-emptive rights might be unable to issue shares into strategically important marketplaces (eg, the US or Japan, where they have a commercial presence).
- Companies with pre-emptive rights lack the flexibility to issue shares in the most attractive marketplace where the shares are in most demand.
- High overseas demand for the shares will mean that they do not need to be issued at a significant discount to market value. Any transfer of value is more than offset by increases in share price due to accessing a greater pool of demand and improving the shares.

3.7 Share Repurchases

Legal requirements covering repurchase of its own shares by a company are contained in the Companies Act 2006. The purpose of the legal rules is to protect creditors of the company by ensuring that the company does not reduce its share capital and non-distributable reserves (known collectively as the 'creditors' buffer') as a result of the repurchase.

A repurchase may be completed off-market or on-market. An off-market purchase is where the shares are either not purchased on a RIE or purchased on an RIE, but are not subject to a marketing arrangement on that RIE. A marketing arrangement is where the shares are listed on the exchange or the company has been afforded dealing facilities on the exchange.

For an off-market purchase, the terms of the contract of purchase must be approved by special resolution prior to the purchase taking place. For a public company, the authority to make the repurchase must expire within 18 months of the resolution being passed.

For an on-market purchase, an ordinary resolution is required, specifying the maximum number of shares to be purchased, the maximum and minimum prices to be paid and the date on which the authority expires. For a public company, this cannot be greater than 18 months after the resolution is passed.

3.7.1 Public Companies' Treasury Shares

Public listed companies can repurchase shares and rather than cancel them, hold up to 10% of their issued share capital as treasury shares. The company is then permitted to sell the treasury shares at a later date.

3.7.2 Private Companies

Private companies may repurchase their own shares even if the capital base (usually share capital plus share premium, which is sometimes referred to as the creditors' buffer) is reduced as a result. The extent by which the capital base is to be reduced is known as the permissible capital payment (PCP). However, if a private company wishes to reduce its capital base, it must comply with certain requirements.

- As much of the repurchase as possible must be financed from distributable reserves (ie, the distributable reserves must be zero before the capital base can be reduced).
- Any capital payment must be approved by special resolution.
- The directors must make a statutory declaration that there are no grounds on which the company could be found unable to pay its debts and can continue as a going concern for the next year. A director who makes such a declaration without having reasonable grounds for doing so is liable to imprisonment and/or a fine.
- An auditors' report must be annexed to the statutory declaration stating that the auditors have inquired into the company's affairs, the capital payment has been properly calculated and they are not aware of anything to indicate that the directors' declaration is unreasonable.
- The Companies Act also stipulates advertising requirements in the London Gazette and the national press.

3.7.3 Accounting Requirements

We illustrate the accounting treatment for:

1. A share repurchase where the shares are cancelled.
2. A share repurchase where the shares are held as treasury shares and later resold.

The company has:

- 1,000,000 £1 ordinary shares in issue.
- Market price: £3.

Summarised balance sheet:

Initial Position (£'000)	£'000
Net assets	2,500
Share capital	1,000
Share premium	500
Retained earnings	1,000
Total equity	2,500

The company repurchases 100,000 shares at £3 per share.

Total cost = £300,000.

Exercise 1.4**Repurchase and Cancellation of Shares****Step 1: Repurchase and Cancellation**

The company repurchases and cancels 100,000 shares.

Nominal value cancelled:

$$100,000 \times £1 = £100,000$$

Premium element:

$$£300,000 - £100,000 = £200,000$$

Accounting impact:

- Cash down by £300,000
- Share capital down by £100,000
- Retained earnings down by £200,000

Step 2: Capital Redemption Reserve (CRR)

Under UK capital maintenance rules, when shares are cancelled out of distributable profits, an amount equal to the nominal value (£100,000) must be transferred from retained earnings to a capital redemption reserve (CRR).

This is a reclassification within equity:

- Retained earnings down by £100,000
- Capital redemption reserve up by £100,000

Final Position After Cancellation (£'000)	£'000
Net Assets	2,200
Share Capital	900
Share Premium	500
Capital redemption reserve	100
Retained earnings	700
Total equity	2,200

Explanation

- Cash reduces by £300,000.
- Share capital reduces by £100,000.
- Total retained earnings reduce by £300,000 (200 premium element + 100 transferred to CRR).
- CRR replaces the cancelled nominal capital for capital maintenance purposes.
- Total equity falls by the cash paid (£300,000).

Exercise 1.5

Repurchase and Holding as Treasury Shares

Using the same starting position.

The company repurchases 100,000 shares at £3 but does not cancel them. The shares are held in treasury.

Step 1: Repurchase (Treasury Shares)

Under UK accounting treatment:

- Cash down by £300,000
- Retained earnings down by £300,000

There is:

- No reduction in share capital.
- No need to create a capital redemption reserve.
- The shares remain issued but are held in treasury and carry no voting or dividend rights.

Position After Repurchase (£'000)	£'000
Net assets	2,200
Share capital	1,000
Share premium	500
Retained earnings	700
Total equity	2,200

Subsequent Sale of Shares

The company sells the 100,000 treasury shares at £4 per share.

Cash received:

$$100,000 \times £4 = £400,000$$

Original cost: £300,000

Excess: £100,000

Accounting impact:

- Cash up by £400,000
- Retained earnings up by £300,000 (reversal of original reduction)
- Share premium up by £100,000

The excess over original cost is credited to share premium.

Final Position After Sale (£'000)	£'000
Net assets	2,600
Share capital	1,000
Share premium	600
Retained earnings	1,000
Total equity	2,600

Explanation

- The original reduction in retained earnings is fully restored.
- The additional £100,000 is credited to share premium.
- Share capital remains unchanged throughout because the shares were not cancelled.
- Total equity increases by the net gain of £100,000.

Key Distinction

Cancellation	Treasury
Share capital reduced	Share capital unchanged
CRR required	No CRR required
Retained earnings permanently reduced	Retained earnings can be restored if shares resold
Capital structure changes	Flexibility retained

End of Chapter Questions

Think of an answer for each question and refer to the appropriate section for confirmation.

1. **What are the typical rights associated with holding ordinary shares in a company and why are these rights significant for shareholders?**

Answer reference: Section 1.1.1

2. **What are the potential advantages and drawbacks associated with founder shares with respect to their use in equity financing for a company?**

Answer reference: Section 1.2.1

3. **What are non-voting shares and how do they function in terms of control and governance within a company?**

Answer reference: Section 1.2.2

4. **What are deferred shares, and how do they differ from ordinary shares in terms of dividend entitlement and conditions for receiving dividends?**

Answer reference: Section 1.2.3

5. **How do participating preference shares differ from regular preference shares and what rights do they have in terms of profit sharing and liquidation?**

Answer reference: Section 1.3.2

6. **What are the two primary sources of total return for equity securities, and how do changes in price (capital gains) and dividend income contribute to this return?**

Answer reference: Section 1.4.1

7. **What is meant by the holding period return and what can it be used for?**

Answer reference: Section 1.4.1

8. **How is the risk associated with an investment, particularly equity securities like shares, connected to the uncertainty surrounding their future earnings?**

Answer reference: Section 1.4.2

9. **Explain how the type and specific attributes of equity securities, such as preference shares and ordinary shares, influence the level of risk.**

Answer reference: Section 1.4.2

10. **Apart from income uncertainty, what other factors can contribute to variations in the return on an investment?**

Answer reference: Section 1.4.2

11. **Explain the two primary approaches investors have for investing in foreign equities.**

Answer reference: Section 1.5

12. **Describe the process for creating depository receipts (DRs) and what are the benefit for companies.**

Answer reference: Section 1.5.1

- 13. What is the primary purpose of American Depositary Receipts (ADRs) for US investors and how do they facilitate investment in foreign companies?**

Answer reference: Section 1.5.1

- 14. What is the primary purpose of Global Depositary Receipts (GDRs), and how do they facilitate international investment in foreign companies?**

Answer reference: Section 1.5.1

- 15. How do GDRs differ from American Depositary Receipts (ADRs) in terms of their trading availability?**

Answer reference: Section 1.5.1

- 16. Distinguish between a fixed price offer and a tender offer when determining the price of shares for an IPO?**

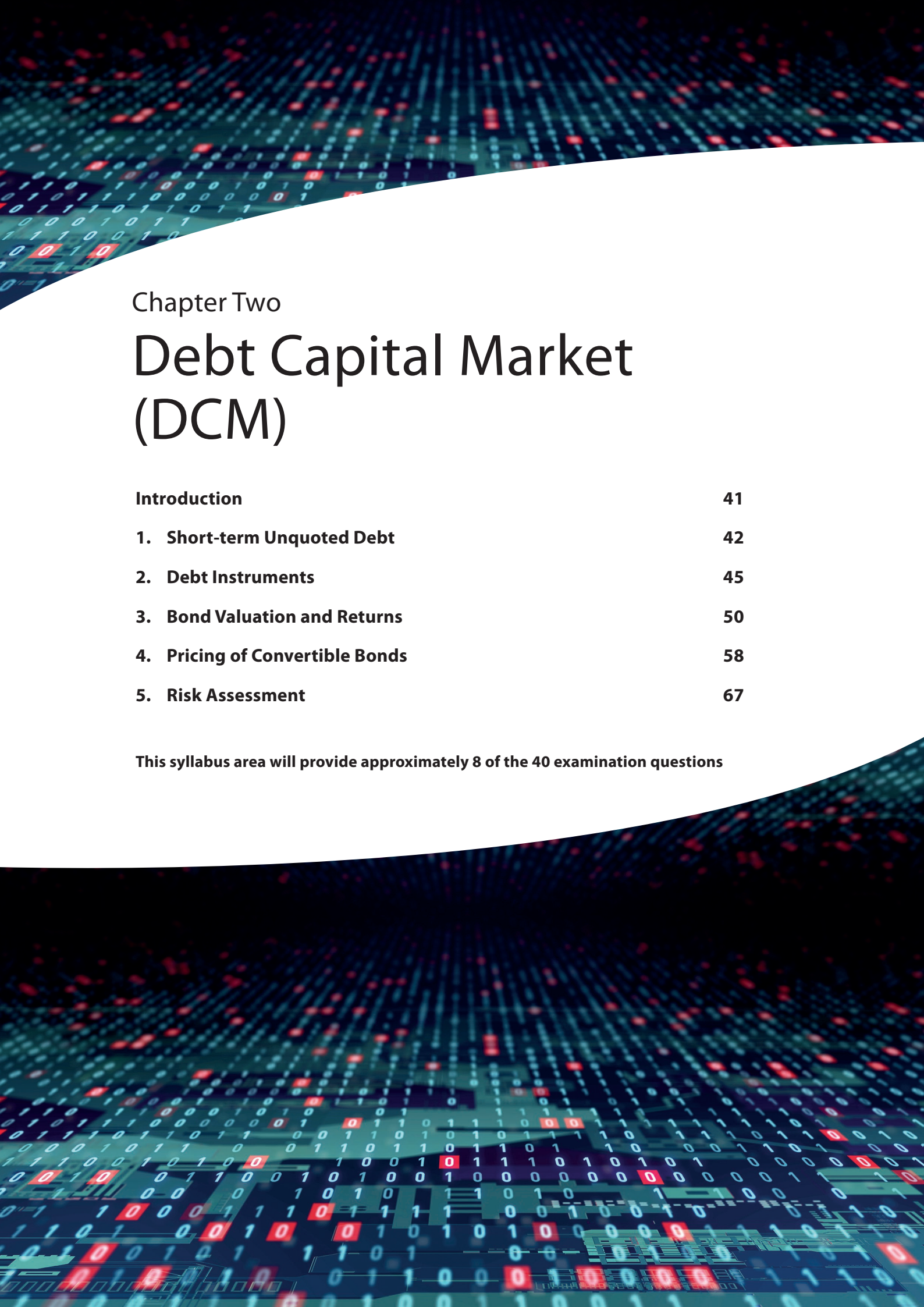
Answer reference: Section 3.1

- 17. Explain what is meant by a greenshoe option.**

Answer reference: Section 3.3

- 18. Outline the arguments for pre-emption rights.**

Answer reference: Section 3.6.1



Chapter Two

Debt Capital Market (DCM)

Introduction	41
1. Short-term Unquoted Debt	42
2. Debt Instruments	45
3. Bond Valuation and Returns	50
4. Pricing of Convertible Bonds	58
5. Risk Assessment	67

This syllabus area will provide approximately 8 of the 40 examination questions



Introduction

Many companies turn to banks to borrow money in addition to the capital raised from shareholders. This approach offers several advantages. Shareholders, including company directors, do not need to give up any ownership of the company. Furthermore, the interest paid on bank loans is tax-deductible, which makes the overall cost of the loan relatively cheaper. While borrowing from a bank is an option, companies also have numerous other sources of debt financing available to them. Debt capital markets (DCMs) refer to the financial markets where organisations and governments raise capital by issuing debt securities to investors.

Debt securities are financial instruments that represent borrowed money and the promise to repay the **principal** amount, usually along with interest over a specified period. DCM plays a crucial role in facilitating the flow of funds from investors to issuers enabling businesses and governments to finance their operations, projects or initiatives.

Key components and aspects of debt capital markets include:

- **Debt securities** – DCM involves the issuance of various types of debt securities. These securities come with different maturities, coupon rates and terms, providing flexibility to issuers and appealing investment options to investors.
- **Issuers** – issuers in DCM can range from corporations and financial institutions to government entities. They raise capital through debt issuance for purposes like funding expansion, refinancing existing debt or covering operational expenses.
- **Investors** – DCM attracts a diverse group of investors, including institutional investors and individual investors. Investors seek debt securities as a way to generate income and diversify their portfolios.
- **Primary and secondary markets** – DCM operates in both the primary and **secondary markets**. In the **primary market**, issuers sell newly issued debt securities to investors, raising

capital. In the secondary market, previously issued securities are bought and sold among investors, providing liquidity to the debt market.

- **Underwriting and investment banks** – investment banks and underwriters play a crucial role in DCM. They assist issuers in structuring, pricing, and marketing their debt offerings to investors. They also help ensure compliance with regulatory requirements.
- **Rating agencies** – credit rating agencies assess the creditworthiness of issuers and assign credit ratings to their debt securities. These ratings influence investor confidence and the pricing of the debt. In recent years, major credit rating agencies such as Moody's, S&P, and Fitch have increasingly integrated environmental, social, and governance (ESG) factors into their rating methodologies, recognising that sustainability risks can have a material impact on creditworthiness.
- **Regulation** – DCM is subject to regulatory oversight to protect the interests of investors and maintain market integrity. Regulations can vary by jurisdiction and may include disclosure requirements, transparency rules and investor protection measures.
- **Risk and return** – investors in DCM assess the risk and potential return associated with different debt securities. Factors such as the issuer's creditworthiness, interest rate environment and economic conditions can impact the risk-return profile of debt investments.
- **Global nature** – DCM is a global market, allowing issuers to tap into international investors and diversify their funding sources. This global reach has led to the development of various types of debt instruments and markets, including eurobonds and international **bond** offerings.

In this chapter, we will be looking at debt finance, bond valuation and the risk in the context of DCM.

The chapter begins by exploring the fundamentals of short-term unquoted sources of debt finance, such as **overdraft** facilities, revolving credit, working capital, debt factoring and invoice discounting. We then look into the characteristics of various debt instruments, from traditional redeemable bonds to more recent additions to the DCM landscape such as green bonds.

Bond valuation is covered next. The section provides insight into how to evaluate bonds based on market **discount rates**, unravel the concept of **yield to maturity (YTM)** and explores the relationship between bond prices and interest rates.

Finally, risk is considered. Macaulay duration and modified duration are looked at as a means of measuring risk. Convexity is then covered demonstrating its role in bond pricing and the true relationship between bond prices and interest rates.

1. Short-term Unquoted Debt

Learning Objective

- 2.1.1 Know the basic characteristics of short-term unquoted sources of debt finance including overdraft facilities, revolving credit facilities, working capital, debt factoring and invoice discounting

Short-term unquoted sources of debt finance are financial instruments that provide businesses with quick access to capital for short-term needs (usually less than one year). These financing options are

typically used to manage day-to-day operations, cover short-term expenses, and ensure smooth cash flow. Here are the basic characteristics of some common short-term unquoted sources of debt finance:

1.1 Overdraft Facilities

An overdraft facility is a credit line offered by a bank that allows a company to withdraw more funds than it has in its account, up to a predetermined limit. Businesses can use overdrafts as needed, making them a flexible source of short-term financing. Interest is charged only on the amount borrowed and for the duration of the overdraft.

1.2 Revolving Credit Facilities

Similar to overdrafts, revolving credit facilities provide businesses with access to a line of credit. However, they are typically set up as formal loan agreements with predetermined terms. Businesses can draw and repay funds within the credit limit over time. Once repaid, the credit becomes available again. Interest is charged on the outstanding balance, and payments are often structured as monthly instalments.

1.3 Debt Factoring

Debt factoring involves selling accounts receivable (unpaid invoices) to a factoring company at a discount. The factoring company collects the outstanding payments from customers. This provides immediate cash flow as the company receives a portion of the invoice amount upfront from the factoring company. Factoring companies charge fees and take a percentage of the invoice amount as compensation.

1.4 Invoice Discounting

Invoice discounting is similar to debt factoring but allows the business to maintain control over the collection of outstanding invoices. Essentially, the company's invoices are used as collateral for the loan. Customers may not be aware of the financing arrangement since the business retains responsibility for collecting payments. Interest is charged on the borrowed amount and the loan is typically structured as a **revolving credit facility**.

1.5 Working Capital

Working capital is not typically considered a source of **short-term finance**; rather it is a measure of a company's short-term financial health and liquidity. However, if the components of working capital are managed well (eg, good credit control), it can help reduce short-term financing needs.

Working capital represents the difference between a company's **current assets** and current liabilities and is used to assess specifically the company's ability to meet its short-term financial obligations.

$$\text{Working capital} = \text{Current Assets} - \text{Current Liabilities}$$

- **Current assets** – these are assets that are expected to be converted into cash or used up within one year. They include items such as cash, accounts receivable, inventory, and short-term investments.
- **Current liabilities** – these are obligations that are expected to be settled within one year. They include items such as accounts payable, short-term loans and accrued expenses.

The working capital figure can be positive or negative. If a company's current assets exceed its current liabilities, it has positive working capital. This suggests that the company has sufficient short-term resources to cover its immediate financial obligations. If a company's current liabilities exceed its current assets, it has negative working capital. This indicates potential liquidity problems and may require additional financing to cover short-term obligations.

In essence, working capital management involves optimising the balance between a company's current assets and current liabilities to ensure it has sufficient resources to operate smoothly and meet its financial obligations as they come due. Effective working capital management can help reduce the need for external short-term financing and improve a company's overall financial stability. Steps that may be taken to improve working capital include:

1. **Manage Accounts Receivable:**
 - Implement efficient credit policies to ensure timely payments from customers.
 - Offer discounts or incentives for early payments to encourage prompt settlements.
 - Regularly review and assess customer creditworthiness to minimise bad debts.
2. **Streamline Inventory Management:**
 - Optimise inventory levels to reduce excess stock and carrying costs.
 - Implement just-in-time (JIT) inventory systems to minimise storage expenses.
 - Identify slow-moving or obsolete inventory and take steps to liquidate or reduce it.
3. **Extend Accounts Payable:**
 - Negotiate favourable payment terms with suppliers without harming relationships.
 - Take advantage of supplier discounts for early payments when it makes financial sense.
 - Carefully manage payment schedules to align with cash flow.

1.6 Summary

In summary, these above short-term unquoted sources of debt finance provide businesses with the flexibility to manage their immediate financial needs. However, they often come with interest costs or fees, and the choice of financing depends on factors such as the company's financial situation, creditworthiness and the nature of its cash flow requirements. It's essential for businesses to carefully assess their short-term financing options to ensure they choose the most suitable solution for their specific needs.

2. Debt Instruments

Learning Objective

- 2.1.2 Know the basic characteristics of the following types of debt instruments: redeemable bonds; irredeemable/perpetual bonds; zero-coupon bonds; convertible bonds; callable and puttable bonds; contingent convertible bonds (CoCos); exchangeable bonds; medium-term notes; eurobonds; green bonds; blue bonds; transition bonds; commercial paper; floating rate notes

A debt instrument, also known as a fixed-income security or bond (in the UK, government bonds are known as 'gilts'), is a financial contract that represents a loan made by an investor to an issuer, typically a government or corporation. Debt instruments are a form of borrowing and lending where the issuer borrows money from investors and agrees to repay the principal amount at a specified future date along with periodic interest payments.

Key characteristics of debt instruments include:

1. **Principal amount** – this is the initial amount of money borrowed by the issuer, which the issuer agrees to repay to the investor at the maturity date.
2. **Interest rate** – also known as the coupon rate, it is the annual interest rate that the issuer agrees to pay to the investor. Interest payments are typically made semi-annually or annually.
3. **Maturity date** – this is the date when the issuer is obligated to repay the principal amount to the investor. Debt instruments can have short-term (less than one year), medium-term (one to ten years), or long-term (over ten years) maturities.
4. **Coupon payments** – these are periodic interest payments made by the issuer to the investor, usually calculated as a fixed percentage of the principal amount. The frequency of coupon payments depends on the terms of the debt instrument.
5. **Face value** – this is the amount that the debt instrument is worth at maturity and it represents the principal amount to be repaid to the investor.
6. **Market price** – the price at which a debt instrument is currently trading in the secondary market. It can be higher or lower than the face value, depending on prevailing interest rates and market demand.

Additional characteristics of bonds include:

- **Credit rating** – a corporate issue will usually seek a credit rating for the bond from a ratings agency such as S&P or Moody's.
- **Certificates** – historically, many bonds were issued in bearer form, meaning the physical certificate conferred ownership and no central register was maintained. Today, however, almost all publicly traded bonds in major markets are issued in dematerialised electronic form, with ownership recorded through international clearing systems such as Euroclear and Clearstream. This reflects regulatory reforms and global efforts to prevent misuse of bearer securities for illicit purposes.
- **Security** – bonds may be secured or unsecured and the security held is by way of a fixed or **floating charge**.
- **Listing** – bonds are freely **transferable**, ie, they may be admitted to listing on a stock exchange similar to equities, or traded **over-the-counter (OTC)** by agreement with a bank.

Debt instruments serve as a way for entities to raise capital for various purposes, such as financing operations, funding projects, or refinancing existing debt. They also provide investors with a predictable stream of income in the form of interest payments and the return of the principal amount at maturity.

2.1 Types of Debt Instruments

Each type of debt instrument serves distinct financial purposes and carries its own risk-return profile. Issuers and investors choose these instruments based on their specific financial goals, market conditions, and risk tolerance.

2.1.1 Redeemable Bonds

Redeemable bonds are debt securities with a fixed maturity date when the issuer **repays the principal** amount to bondholders. These bonds pay periodic interest, or coupon payments, to bondholders throughout their life. The interest rate is predetermined at the time of issuance and is based on market conditions. Redeemable bonds are not perpetual; they have a specified end date when investors receive their principal back.

2.1.2 Irredeemable/Perpetual Bonds

Irredeemable or perpetual bonds have no set maturity date; they are considered indefinite investments. Bondholders receive regular interest indefinitely into the future. Perpetual bonds are relatively rare and are occasionally used by governments and well-established companies to raise capital without committing to principal repayment.

2.1.3 Zero-Coupon Bonds (ZCBs)

Zero-coupon bonds do not make periodic interest payments like traditional bonds. These bonds are issued at a discount to their face value, meaning investors pay less than the bond's ultimate redemption value. The return to investors comes from the difference between the purchase price and the face value upon maturity. Investors realise a capital gain as the bond's value increases over time.

2.1.4 Convertible Bonds

Convertible bonds are hybrid securities that allow bondholders to convert their bonds into a specified number of ordinary shares of the issuing company. They typically enable the issuing company to reduce the coupon rate as the conversion right provides an additional return. The conversion typically occurs at the bondholder's discretion during a predetermined conversion period. Convertible bonds provide investors with both debt and equity exposure, offering potential for capital appreciation if the issuer's share price rises.

2.1.5 Callable Bonds

These bonds give the issuer the right to redeem the bonds before their maturity date. This often happens when prevailing interest rates in the market have declined significantly since the bonds were

originally issued. This means that if the current market interest rates are lower than the coupon rate (the interest rate the issuer pays to bondholders), the issuer can save money by redeeming the bonds and reissuing new ones at the lower prevailing rates. This is a cost-saving measure for the issuer but an additional risk for the bondholder (especially if interest rates are falling).

2.1.6 Puttable Bonds

Puttable bonds give the bondholders the option, but not the obligation, to sell the bonds back to the issuer at a predetermined price, which is typically the bond's face value (par value). This option becomes available after a specific period, known as the put protection period, during which bondholders cannot exercise the put option. Once this period expires, bondholders can decide to put the bonds back to the issuer at any time.

Bondholders may choose to put their bonds back to the issuer for various reasons. One common scenario is when prevailing interest rates in the market have risen significantly since the bonds were originally issued. This means that if the current market interest rates are higher than the bond's coupon rate (the interest rate the issuer pays to bondholders), bondholders can sell their bonds back to the issuer at the predetermined price and reinvest their funds in higher-yielding investments.

2.1.7 Contingent Convertible Bonds (CoCos)

A **Contingent Convertible**, often referred to as a 'CoCo' bond, is a type of hybrid financial instrument that combines features of both debt and equity. CoCo bonds are designed to provide banks and financial institutions with a mechanism to strengthen their capital positions during times of financial stress.

What sets CoCo bonds apart is the presence of a trigger mechanism. These triggers are predefined conditions that, when met, can lead to the conversion of the bond into equity or the write-down of the bond's principal. The trigger conditions are typically related to the financial health of the issuing bank. When the trigger conditions are met, CoCo bonds can be automatically converted into a predetermined number of common shares or another form of equity in the issuing bank. This conversion helps bolster the bank's capital position by increasing its equity base. In some cases, instead of conversion to equity, the CoCo bond's principal may be partially or fully written down. This means that bondholders may incur losses on their investment as the bond's face value is reduced.

Recent events, such as the 2023 Credit Suisse rescue, where CHF 16 billion of Additional Tier 1 (AT1) bonds were written down, highlight the risks investors face in these instruments.

2.1.8 Exchangeable Bonds

Exchangeable bonds allow bondholders to exchange their bonds for shares of a different company, often a subsidiary or a related entity of the issuer. Investors have the flexibility to benefit from potential share price appreciation in the designated company. The use of exchangeable bonds can be to provide a way for a group to divest an unwanted investment.

2.1.9 Medium Term Notes (MTNs)

MTNs are flexible debt instruments with maturities ranging from one to ten years, allowing issuers to customise terms to meet their specific financing needs as they permit different maturities, currencies, coupons and instruments (**commercial paper (CP)** or longer term bonds). They are often used by corporations and government agencies for medium-term funding requirements.

2.1.10 Eurobonds

A eurobond is a type of bond denominated in a currency that is different from the currency of the country where it is issued. For example, a US dollar eurobond could be issued anywhere in the world except for the US. Eurobonds are typically issued in major international financial centres, such as London, Luxembourg, or Zurich, and are often used by governments, corporations, and international organisations to raise capital from a global investor base.

Historically, eurobonds were often issued in bearer form, meaning the physical certificate conferred ownership and there was no central register of holders. However, regulatory reforms, including the EU's Central Securities Depositories Regulation (CSDR) and tighter anti-money laundering and counter-terrorist financing (AML/CTF) rules, have led to the near elimination of bearer form issuance.

Today, the majority of Eurobonds are issued in dematerialised or registered electronic form and ownership is recorded through international central securities depositories such as Euroclear and Clearstream. This ensures compliance with modern regulatory standards while maintaining efficient cross-border settlement.

2.1.11 Green Bonds and Sustainability-Linked Bonds

Green bonds are issued to raise funds for environmentally friendly projects, such as renewable energy, energy efficiency, or sustainable infrastructure. The proceeds from green bonds are earmarked for these specific projects, and issuers often report on the environmental impact of the funds raised. Most green bonds are issued in alignment with the **International Capital Market Association's (ICMA) Green Bond Principles (GBP)**, which set voluntary guidelines on use of proceeds, project evaluation, management of funds and reporting.

Alongside green bonds, issuers are increasingly using sustainability-linked bonds (SLBs). Unlike green bonds, where the proceeds are earmarked for specific projects, SLBs allow the funds to be used for general purposes. Instead, the bond's financial terms are linked to the issuer meeting predefined sustainability performance targets, such as reducing carbon emissions. If the targets are not met, the coupon typically 'steps up', increasing the cost of borrowing for the issuer. Sustainability-linked bonds are generally issued in line with ICMA's **Sustainability-Linked Bond Principles (SLBP)**, which provide guidance on setting targets, structuring financial terms, and reporting progress.

2.1.12 Blue Bonds

Blue bonds are designed to finance marine conservation and sustainable ocean-related projects, such as fisheries management, coral reef protection, and coastal preservation. The first sovereign blue bond was issued by Seychelles in 2018, and since then several multilateral development banks and sovereigns

have supported similar initiatives. Blue bonds are not governed by a separate, formal ICMA framework. Instead, they are generally structured as a subset of green bonds and therefore issued in alignment with the ICMA GBP. The World Bank (which helped structure the first sovereign blue bond for the Seychelles in 2018) explicitly states that blue bonds are a sub-category of green bonds with proceeds directed to ocean-related projects.

Source: (Case-Study-Blue-Bond-Seychelles.pdf)

<https://thedocs.worldbank.org/en/doc/cbaf1cefc5164a7f340716ef0af6fd7e-0340012025/original/Case-Study-Blue-Bond-Seychelles.pdf?>

2.1.13 Transition Bonds

Transition bonds fund projects that facilitate a transition to a more sustainable or low-carbon economy. They often support companies' efforts to reduce their environmental impact. Unlike green bonds, transition bonds do not yet have a universally accepted framework, though issuers are encouraged to follow guidance such as ICMA's Climate Transition Finance Handbook. Because of this, they are sometimes criticised for potential 'greenwashing' if the issuer's transition strategy is not credible or transparent.

2.1.14 Commercial Paper

Commercial paper is a short-term, unsecured debt instrument issued by corporations to meet immediate financing needs. These notes typically have maturities of less than one year and are usually considered safe investments for investors with short-term cash to deploy

2.1.15 Floating Rate Notes (FRNs)

Floating Rate Notes (FRNs) have variable interest rates that adjust periodically based on a reference benchmark rate and a fixed spread. They provide protection to investors against changes in market interest rates and are often considered when interest rate uncertainty is a concern. FRNs can offer a way to potentially benefit from rising rates while limiting downside risk to principal value. While with a fixed rate bond, a change in the interest rates will cause the price of the bond to change (so that the yield reflects the market rate of interest), with a FRN, the coupon will change in line with market interest rates. As such, this will result in the value of the bond remaining constant at around par value.

3. Bond Valuation and Returns

Learning Objective

- 2.2.1 Be able to analyse the price of a bond given a market discount rate
- 2.2.2 Know what is meant by a bond's yield to maturity and the sources of return from investing in a fixed coupon bond
- 2.2.3 Know the relationship between bond prices and interest rates
- 2.2.4 Be able to analyse the price of a bond given spot rates
- 2.2.5 Understand the use of matrix pricing for illiquid or infrequently traded bonds
- 2.2.6 Understand the relationship between bond prices and other bond characteristics such as time to maturity and coupon

The value of a bond is calculated using a **present value** formula, which takes into account the future cash flows that the bond will generate, including both the periodic interest payments (coupon payments) and the principal repayment (face value or par value) at maturity.

3.1 Bond Pricing with a Market Discount Rate

The market discount rate or market interest rate represents the required rate of return by investors given the risk of the investment in the bond. To calculate the value of the bond, simply discount the future cash flows at the market discount rate.

Exercise 2.1

A company issues a four-year bond with a coupon rate of 5%. Assuming that the coupon is paid annually, and the par value of the bond is £100, what would be the value of the bond if the market discount rate is 4%?

Solution

Year	Cashflow (£)	Discount factor @ 4%	Present value (£)
1	5	$1/1.04$	4.81
2	5	$1/1.04^2$	4.62
3	5	$1/1.04^3$	4.44
4	105	$1/1.04^4$	89.75
Total			103.62

The value of the bond is therefore £103.62.

Exercise 2.2

A company issues a four-year bond with a coupon rate of 5%. Assuming that the coupon is paid annually, and the par value of the bond is £100, what would be the value of the bond if the market discount rate is 6%?

Solution

Year	Cashflow (£)	Discount factor (6%)	Present value (£)
1	5	$1/1.06$	4.72
2	5	$1/1.06^2$	4.45
3	5	$1/1.06^3$	4.20
4	105	$1/1.06^4$	83.17
Total			96.54

The value of the bond is therefore £96.54.

Exercise 2.3

A company issues a four-year bond with a coupon rate of 5%. Assuming that the coupon is paid annually, and the par value of the bond is £100, what would be the value of the bond if the market discount rate is 5%?

Solution

Year	Cashflow (£)	Discount factor (5%)	Present value (£)
1	5	$1/1.05$	4.76
2	5	$1/1.05^2$	4.54
3	5	$1/1.05^3$	4.32
4	105	$1/1.05^4$	86.38
Total			100.00

The value of the bond is therefore £100.

Notice from the above exercises that when the discount rate is:

- less than the coupon, the bond trades at a premium to par
- equal to the coupon, the bond trades at a par

- greater than the coupon, the bond trades at a discount to par.

3.2 Sources of Return

For an investor, the returns from a bond come from the following sources:

1. Income from coupon/interest payments.
2. Gain/loss on redemption, ie, capital gains or losses that may occur if the bond is bought or sold at a price different from its face value.
3. Reinvesting the income. When bondholders receive coupon payments, they can reinvest these funds in other investments.

3.2.1 The Flat Yield

The simplest measure of a bond's return used in the market is the flat yield. This is also referred to as the **running yield** or the interest yield. It looks at the cash return generated by an investment over the cash price. In simple terms, what is the income that you generate on the money that you invest?

$$\text{Flat yield} = \frac{\text{Annual coupon rate}}{\text{Market price}} \times 100$$

For example:

- 5% Loan stock
- Redemption is in ten years at par
- Current market price 97.25.

The flat yield for the above would be:

$$\frac{5}{97.25} \times 100 = 5.14\%$$

Limitations of the Flat Yield

This measure is of some use, particularly in the short term, but it has three important drawbacks for the investment markets.

- With all equities and some bonds (FRNs), the return in any one period will vary. If the coupon is not constant, then the measure is only of historic value unless the predicted return is used.
- In addition to the coupon flows, bonds will have return in the form of the redemption monies. Where the bond has been purchased at a price away from par, this will give rise to potential gains and losses.
- Finally, the calculation completely ignores the time value of money. If an investor were to be offered the choice between the receipt of £10 now or in one year's time, the logical choice would be to take the £10 now, since the money could then be invested to generate interest.

These drawbacks combine to make the flat yield of limited use.

3.2.2 Yield to Maturity (YTM)

The yield-to-maturity (YTM) represents the **internal rate of return (IRR)** generated by the bond's cash flows. It is also known as the gross redemption yield (GRY). This IRR is the interest rate that equates the discounted future cash flows to the bond's market price. It serves as the implied discount rate prevailing in the market for the bond.

The YTM overcomes the limitations of the flat yield and is a more complete measure of return as it takes into account the time value of money and captures all the elements of return from a bond (as mentioned above). It is essentially the rate of return that the bondholder would earn if they hold the bond to maturity, all coupon payments are made in full and in a timely manner, the bond is redeemed at the redemption date at par and the investor is able to reinvest coupons at the same rate as the YTM.

As a measure of predicted return, the YTM is limited, since it assumes that any coupon receipts are reinvested at the same rate as the YTM. If the investor is only able to reinvest the coupon at a lower rate, then the overall return generated by the bond will be lower than the yield.

One further criticism of the YTM is that it discounts all flows in the future by the same rate when, as we shall see from the yield curve, the rate of return varies for monies of different maturities.

3.3 Bond Pricing with Spot Rates

The spot rate is the rate of interest that the market demands for money of a specific term, eg, the rate for six-month or one-year money. It is also referred to as the zero-coupon rate, since it is the rate of interest to be applied to a bond with only one cash flow, that on maturity, ie, a zero coupon bond.

The idea of spot rates argues that it is inappropriate to use one interest rate, the YTM/IRR, to discount all the future cash flows of a bond. Rather, investors will disaggregate the bond into separate flows occurring at different times and use different interest rates to discount each flow, ie, the market discount rate that corresponds to the cash flow dates. Thus, in calculating the value of a bond using spot rates, the interest rate used for cashflows of a particular maturity is the spot rate for that maturity.

Exercise 2.4

A company issues a four-year bond with a coupon rate of 5%. Assuming that the coupon is paid annually, and the par value of the bond is £100, what would be the value of the bond given spot rates of 5% (year 1), 6% (year 2), 7% (year 3) and 8% (year 4)?

Solution

Year	Cashflow (£)	Discount factor	Present value (£)
1	5	1/1.05	4.76
2	5	1/1.06 ²	4.44
3	5	1/1.07 ³	4.08
4	105	1/1.08 ⁴	77.18
Total			90.46

The value of the bond using spot rates is therefore £90.46.

3.4 Matrix Pricing

Matrix pricing is a method used to estimate the price of illiquid bonds, particularly those that do not trade frequently in the open market. It is a valuable technique for valuing bonds when there is a lack of readily available market prices or when the bonds do not have active trading activity. The steps involved are outlined below:

1. **Identifying comparable bonds** – the first step is to identify a set of comparable bonds that closely resemble the characteristics of the illiquid bond. These comparable bonds should serve as a proxy for estimating the value of the illiquid bond.
2. **Gather data** – to use matrix pricing, you need a database of bond prices and yields for similar, but more liquid, bonds. These similar bonds are often referred to as 'comparable bonds' or 'benchmark bonds'. These bonds should have similar characteristics to the illiquid bond you want to value, such as credit rating, maturity, coupon rate and issuer.
3. **Build a pricing matrix** – using the data on the comparable bonds, create a matrix that shows the relationship between various bond characteristics (eg, time to maturity, credit rating) and their corresponding yields or prices. This matrix is often constructed through statistical analysis, and it allows you to estimate how changes in these characteristics affect bond prices or yields.
4. **Map the illiquid bond** – determine where the illiquid bond fits within the pricing matrix based on its specific characteristics. This involves finding the closest matches among the comparable bonds in the matrix.
5. **Extrapolate the value** – once the illiquid bond is mapped within the matrix, you can extrapolate its value based on the observed prices or yields of the comparable bonds. The idea is that the illiquid bond's value should be similar to the values of the comparable bonds with similar characteristics.

6. **Make adjustments** – depending on the specifics of the illiquid bond, you may need to make adjustments to the estimated value. Factors like the bond's unique features, issuer-specific risks or market conditions not captured by the matrix may require you to apply additional adjustments.
7. **Final valuation** – after considering any adjustments, you arrive at a final estimated value for the illiquid bond. This estimated value represents an approximation of what the bond might be worth in the absence of active market pricing.

Exercise 2.5

You are using matrix pricing to estimate the **fair value** of an illiquid bond with a maturity of six years and a coupon rate of 5%. You have identified two comparable bonds in your pricing matrix:

Bond A: Maturity – 5 years, Yield – 4.2%

Bond B: Maturity – 7 years, Yield – 5.1%

What is the estimated price and yield for the illiquid bond?

Solution

To estimate the price and yield for the illiquid bond using matrix pricing, we will interpolate between Bond A and Bond B based on their maturities, yields, and prices.

First, let's estimate the yield for the illiquid bond:

Yield Interpolation Formula

The following formula shows the method for interpolating the yield of an illiquid bond using matrix pricing. The formula adjusts the yield proportionally based on the relative maturity position of the illiquid bond between two comparable liquid bonds.

Yield for illiquid Bond = Yield Bond A + ((Yield Bond B – Yield Bond A)/(Maturity Bond A – Maturity Bond B)) × (Maturity illiquid Bond – Maturity Bond A)

Yield for illiquid Bond = 4.2% + ((5.1% – 4.2%)/(7 years – 5 years)) × (6 years – 5 years) = 4.65%

Explanation

The formula first calculates the change in yield per year between Bond A (shorter maturity bond) and Bond B (longer maturity bond). This annualised yield change is then multiplied by the difference in maturity between the illiquid bond and Bond A. The result is added to the yield of Bond A to obtain the interpolated yield.

Now let's calculate the bond's price:

Year	Cashflow (£)	Discount factor @ 4.65%	Present value (£)
1	5	1/1.0465	4.78
2	5	1/1.0465 ²	4.57
3	5	1/1.0465 ³	4.36
4	5	1/1.0465 ⁴	4.17
5	5	1/1.0465 ⁵	3.98
6	105	1/1.0465 ⁶	79.94
Total			101.80

The price of the illiquid bond is therefore £101.80.

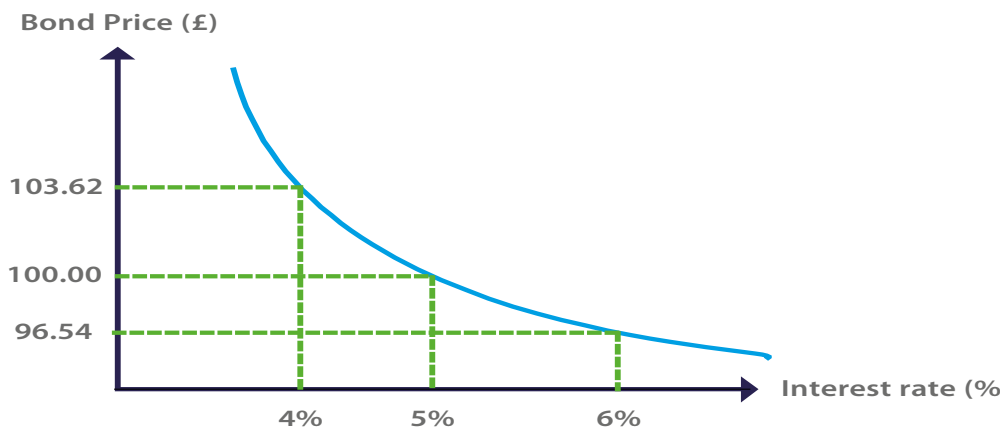
3.5 Relationship between Bond Prices and Interest Rates

Bond prices and interest rates generally move in opposite directions. When interest rates rise, bond prices tend to fall and when interest rates fall, bond prices tend to rise. There is therefore an inverse relationship between bond prices and interest rates.

Using the results from Exercises 2.1, 2.2 and 2.3 above, we observe this inverse relationship:

Interest rate	Price (£)
4%	103.62
5%	100.00
6%	96.54

From the table above we can see that as the interest rate moves up, the bond price falls. This is illustrated in the diagram below:



It should be noted that the relationship between the yield and the price is not linear but exhibits convexity. This is a relationship that we will return to later.

3.6 Relationship Between Bond Prices and Maturity

Longer dated bonds will be more sensitive to changes in the interest rate than shorter dated ones: ie, for the same change in yield, they will experience a greater price change. Consider three bonds with the same coupon but different maturity dates.

Given a particular level of coupon and maturity date, the price of each bond can be calculated for each given gross redemption yield, as follows.

	YTM		
	8%	10%	12%
Short 12% 4-year bond price	113.24	106.34	100
Medium 12% 7-year bond price	120.83	109.74	100
Long 12% 26-year bond price	143.23	118.32	100

At a gross redemption yield of 12%, all three bonds have a price of 100. This would be expected, since they all pay a coupon of 12%. As the gross redemption yield falls, the price of all the bonds rises. The greatest rise is for the long-dated bond, from 100.00 to 143.23, illustrating that it has the most volatile price.

3.7 Relationship Between Bond Prices and Coupon

With regard to the level of coupon, it is the lower coupon bonds that demonstrate the greatest level of sensitivity to the yield. Consider three bonds with the same maturity date but different levels of coupon. As with the above example, the price of each of the bonds can be calculated for different YTM.

	YTM		
	9%	10%	11%
Bond A – 5% 15-year bond price	67.75	61.97	56.85
Bond B – 10% 15-year bond price	108.0	100	92.81
Bond C – 15% 15-year bond price	148.3	138.03	128.76

In this example, the price of the bond with the lowest coupon exhibits the most volatility. Notice that the price of the 10% coupon bond (bond A) moves from £61.97 to £67.75, a change of 9%, when the YTM moves from 10% to 9%. Compare this to the price movement on the 10% bond (bond B) – for the same change in YTM (10% to 9%), the price moves from £100 to £108, or 8%. The bond with the lower coupon exhibits greater price sensitivity, all other things being equal.

4. Pricing of Convertible Bonds

Learning Objective

2.2.7 Understand the valuation of convertible bonds

When issuing a convertible, a company will need to ensure that it is fairly priced. If the price is too expensive, then investors will not buy the convertible stock and the issue will flop. If the price is very cheap, then the company will be obtaining finance on disadvantageous terms and the value for existing

shareholders will fall. Valuation of convertibles is very difficult to do in practice, but various models have been developed. Two common methods are the crossover method and the option pricing method.

4.1 The Crossover Method

The crossover method values convertibles by looking at the cash flows that will accrue to investors and discounting them at the appropriate required rate of return. For a bond with a specific conversion date, for example, in three years' time, the cash flows to the investors are fairly easy to identify since the debt must be either redeemed or converted in three years' time, with no other dates being relevant. In other circumstances, the date of conversion is more difficult to establish, since investors will be given a range of dates on which conversion can occur and so a likely date of conversion needs to be estimated.

The crossover method assumes that conversion takes place when the dividends that would be received from the shares obtained on conversion exceed ('crossover') the interest receipts from the debt. For this reason, it is also known as the income-based approach.

Example

Antonio plc has an existing share price of 140p. Dividends are currently 20p per share and are expected to grow at a constant rate of 5% per annum. The company's cost of equity is 20%. The company has issued 10% convertible loan stock with conversion terms of 40 shares per £100 nominal value. Ignore tax.

Estimate an appropriate market value for the convertible using the crossover method.

Solution

Step 1: Immediate Conversion Value (Parity Value)

If the bond were converted today, the investor would receive 40 shares.

At a share price of 140p, the value of those shares would be:

$$40 \times 140p = 5,600p = £56$$

The immediate conversion value is therefore £56 per £100 nominal.

This represents the current market value of the shares that would be received upon conversion.

Step 2: Compare Interest and Dividend Income

Annual interest on £100 nominal at 10% is:

£10 per year.

Current dividend per share is 20p. On 40 shares, this equals:

$$40 \times 20p = £8 \text{ per year.}$$

Initially, interest exceeds dividend income by £2.

Step 3: Determine the Crossover Point

Dividends grow at 5% per annum. We compare interest income and dividend income over time:

Year	Dividend per Share	Total Dividend (40 shares)	Interest	Income Advantage
1	21.0p	£8.40	£10.00	£1.60
2	22.05p	£8.82	£10.00	£1.18
3	23.15p	£9.26	£10.00	£0.74
4	24.31p	£9.72	£10.00	£0.28
5	25.53p	£10.21	£10.00	–

In Year 5, dividend income exceeds interest income. Under the crossover method, conversion is therefore assumed to take place at the end of Year 4.

Step 4: Present Value of the Income Advantage

The investor benefits from receiving interest rather than dividends for four years. The income advantage for each of those years is discounted at 5% (a conventional assumption under the crossover approach).

Year	Income Advantage (£)	Discount Factor (5%)	Present Value (£)
1	1.60	0.952	1.52
2	1.18	0.907	1.07
3	0.74	0.864	0.64
4	0.28	0.823	0.23

Total present value of the income advantage = £3.46.

Step 5: Final Valuation

Under the crossover method:

Convertible value

= Immediate conversion value

- Present value of the income advantage
= £56.00 + £3.46
= £59.46

Final Answer

The estimated market value of the convertible is approximately £59.46 per £100 nominal.

Note

The cost of equity is not required for this method. The crossover method is a simplified valuation approach that assumes conversion occurs when dividend income exceeds interest income. It does not fully reflect the option characteristics of a convertible bond.

Additional Illustration: Interpreting the Conversion Ratio

Conversion terms are often expressed as a number of shares per £100 nominal.

The general formula is:

$$\text{Number of shares on conversion} = \text{Nominal amount held} \times (\text{Conversion ratio} \div 100)$$

Example

Suppose a convertible bond has conversion terms of 25 shares per £100 nominal, and an investor holds £5 nominal.

Step 1: Determine the number of shares per £1 nominal:

$$25 \div 100 = 0.25 \text{ shares per } £1$$

Step 2: Multiply by the nominal amount held:

$$£5 \times 0.25 = 1.25 \text{ shares}$$

Therefore, the investor would receive 1.25 shares upon conversion.

4.2 Option Pricing Method

The crossover method of valuation is fairly simplistic and easy to calculate. However, it may not give a sensible answer in valuing a convertible, because it only focuses on the income differential between the debt and equity alternatives. It fails to take into account the true nature of the convertible, which is that it is an option to acquire equity.

As such, a more appropriate method of valuing a convertible would be to use option-pricing theory. This says that the total value of the convertible is its value as straight debt, plus the value of the option to convert into equity. The value as straight debt is sometimes referred to as the convertible's 'investment value' and the value of the option is sometimes referred to as the 'investment premium' or 'bond premium'. The investment premium may be expressed as a percentage of the investment value.

4.2.1 Factors affecting Option Values

The value of the option will be determined by a number of factors:

- the exercise price of the option
- the actual price of the underlying share
- expected volatility in the price of the underlying share
- the time to expiry of the option
- interest rates
- whether or not a dividend is due to be paid on the share in the option period.

4.2.2 Price of a Convertible at Expiry

A simple example of this technique would be to consider a convertible on its date of expiry. It can either be converted into shares with a value of £120 or redeemed for cash of £100. Clearly, the total value of the convertible is £120. This is made up of its value as straight debt (£100) plus the value of the option to convert into equity, which must be worth an additional £20. Since the option is at its expiry date, there is no time value and the whole of the £20 is intrinsic value. Remember that intrinsic value is the difference between the market price of the shares (£120) and the exercise price of the option. In the case of a

convertible, the exercise price of the option is the lost proceeds from holding the instrument as straight debt – in other words, £100.

4.2.3 Introducing Time Value

The above example can be extended to illustrate the idea of time value. Assume that the debt has one year to maturity and will be redeemed for £110 cash. Alternatively, the investor can convert into shares at any time over the next year. The current value of the shares is £120. The cost of straight debt is 10%.

The value of the instrument now as straight debt is the present value of the proceeds as debt of £100 ($110/1.1$). The minimum value of the convertible will therefore be £120, being the value of the straight debt of £100 plus the intrinsic value of the option of £20. It is likely, however, that the total value of the convertible will be higher than this due to time value – the fact that the share price may rise even higher over the next year.

If the value of the shares is significantly less than £100, then the value of the convertible is likely to be its value as debt of £100. The option is significantly out-of-the-money and is almost worthless.

4.2.4 Evaluation of Convertibles

When a company issues a convertible bond, it must assess whether the financing is advantageous compared with issuing straight debt.

A convertible provides:

- A benefit: a lower coupon (the “cheap coupon”).
- A cost: issuing equity at conversion instead of repaying debt in cash.

The evaluation therefore compares:

Present value of coupon savings versus present value of the cost of conversion.

If the present value of the cost exceeds the benefit, the convertible is not attractive for existing shareholders.

4.2.5 Cheap Coupon Versus Loss on Conversion

Example

A company issues a convertible bond with the following characteristics:

The convertible has a current market value of £125 and pays a 5% annual coupon. It is expected to convert into equity in three years' time. The estimated market value of the equity that will be issued at conversion is £145.80.

If straight debt had instead been issued at £125 and redeemed at par (£100) in three years' time, the annual coupon required would have been 12%.

The company's cost of equity is 20%.

Required: Evaluate whether issuing the convertible represents good value compared with issuing straight debt.

Step 1: Establish the Benchmark

The comparison is between:

- Issuing straight debt today at £125, paying a 12% coupon and redeeming at £100 in three years.
- Issuing a convertible today at £125, paying a 5% coupon and converting into equity worth £145.80 in three years.

We therefore compare:

1. The saving from the lower coupon.
2. The additional cost of issuing equity instead of redeeming debt.

Step 2: Present Value of the Coupon Saving

Straight debt would require a 12% coupon.

The convertible pays 5%.

Annual saving:

$12\% - 5\% = 7\%$ of £100 nominal = £7 per year.

This saving occurs for three years.

Because this saving is fixed relative to straight debt, it is discounted at the cost of debt (12%).

The three-year annuity factor at 12% is 2.4018.

Present value of coupon savings:

Year	Coupon Saving (£)	Discount Factor (12%)	Present Value (£)
1	7.00	0.893	6.25
2	7.00	0.797	5.58
3	7.00	0.712	4.98

Total:

$$6.25 + 5.58 + 4.98 = \text{£}16.81$$

This represents the benefit of the convertible's cheap coupon.

Step 3: Present Value of the Cost of Conversion

If straight debt were issued, the company would repay £100 in three years.

Under the convertible, the company instead issues shares worth £145.80.

Economic cost in Year 3:

$$145.80 - 100 = \text{£}45.80$$

This amount depends on equity market value and therefore carries equity risk. It is discounted at the cost of equity (20%).

The three-year discount factor at 20% is 0.5787.

Present value of the cost:

$$45.80 \times 0.5787 = \text{£}26.50$$

Step 4: Compare Benefit and Cost

Present value of coupon savings: £16.81

Present value of conversion cost: £26.50

Net impact:

$$16.81 - 26.50 = -\text{£}9.69$$

Conclusion

The present value of the cost of issuing equity exceeds the present value of the coupon saving.

Therefore, issuing the convertible is not good value compared with issuing straight debt.

4.2.6 Conversion Premium

The conversion premium is a simple method of evaluating required increases in the share price to make conversion worthwhile.

$$\text{Conversion premium} = \frac{\text{Conversion price} - \text{Current share price}}{\text{Current share price}} \times 100$$

Example

A convertible bond that has the right to convert into 25 shares is priced at £110. The current share price in the market is £3.95.

If an investor were to buy the convertible debt and immediately convert into 25 shares, this would give a cost per share of (£110 ÷ 25) £4.40. It would clearly not be worthwhile doing this, since the shares could be bought in the marketplace for only £3.95. The purchaser of the convertible will not convert immediately, but will hold the debt, hoping that the share price will rise. The conversion premium indicates by how much the share price needs to rise in order to match the price of acquiring the shares through owning the convertible debt.

$$\frac{£4.40 - £3.95}{£3.95} \times 100 = 11.4\%$$

In this situation, the underlying share price is going to have to rise by 11.4% before the conversion right has any intrinsic value.

The investor would need to look at the length of time before which the conversion right expires and decide whether it is likely that the share price will rise sufficiently over the period to make conversion likely and worthwhile.

In addition, the investor could consider the yield advantage, which the convertible is offering over equity, and compare this to the conversion premium. For example, assume that for the above convertible, the **dividend yield** was 4% and the flat yield on the convertible bond was 6.5%. The current yield advantage is therefore 2.5%. The number of years that it takes for this to repay the conversion premium can be calculated as $11.4 \div 2.5 = 4.56$ years. This is sometimes referred to as the simple breakeven point for the convertible and it can be compared to the investor's required breakeven point.

5. Risk Assessment

Learning Objective

- 2.3.1 Be able to analyse Macaulay duration and modified duration
- 2.3.2 Know what is meant by convexity in terms of the relationship between bond prices and interest rates
- 2.3.3 Be able to calculate a bond's price given the bond's duration and convexity
- 2.3.4 Know the benefits and limitations of duration including the impact of convexity
- 2.3.5 Understand other risk factors relevant to bonds such as credit risk, default risk, currency risk, call risk and re-investment risk

Recall from chapter 1 that the risk associated with any investment is linked to how uncertain its future earnings are. In general, when there is more uncertainty about future earnings, the investment becomes riskier, leading to greater fluctuations in return. In the context of bonds, we assess risk in terms of the bond's price sensitivity. In terms of the bond's price sensitivity to interest rates (interest rate risk), we already know that bond prices have an inverse relationship with interest rates: ie, if rates go up, prices go down and vice versa. In addition, as illustrated in section 3.6, longer-dated bonds exhibit more price sensitivity than shorter-dated bonds and lower-coupon bonds show more price volatility than higher coupon bonds. Bonds with lower yields are also more volatile than bonds with higher yields. This is summarised below::

High Volatility		Low Volatility
Long Dated	>	Short Dated
Low Coupon	>	High Coupon
Low Yields	>	High Yields

While these simple maxims are good indicators of the likely sensitivity to fluctuations in the rate of interest, they do not allow for two bonds to be contrasted. For example, which of the following is likely to be the most sensitive to a rise in interest rates – a high-coupon, long-dated stock, or a low-coupon, short-dated stock? In order to enable two such bonds to be compared, in the 1930s a measure of risk was devised by Frederick Macaulay called duration.

The basic features of sensitivity to interest rate risk will all be mirrored in the duration calculation.

- Longer dated bonds will have longer durations.
- Lower coupon bonds will have longer durations. The ultimate low-coupon bond is a zero-coupon bond where the duration will be the maturity.
- Lower yields will give longer durations. In this case, the present value of flows in the future will rise if the yield falls, lengthening the duration.

The duration of a bond will shorten as the life span of the bond decays. However, the rate of decay will not be at the same rate.

5.1 Macaulay Duration

Macaulay duration is a measure used by bond investors to estimate the weighted average time it takes for a bond to recoup its initial cost, considering both the present value of future cash flows and the timing of those cash flows. It is named after the economist Frederick Macaulay who developed this concept.

In simpler terms, Macaulay duration represents the time it would take for the investment's cash flows to repay the original investment. It considers the time value of money, giving more weight to cash flows that occur earlier in the investment period.

Macaulay duration is commonly used in the bond market to assess the interest rate risk associated with a bond. A higher Macaulay duration implies greater interest rate sensitivity, as the bond's cash flows are more spread out over time.

Duration can be expressed mathematically using the following formula.

$$\text{Macaulay duration} = \frac{\sum_{t=1}^n t \times PV_t}{\sum_{t=1}^n PV_t}$$

where:

PV_t = present value of cash flow in period t (discounted using the redemption yield)
 n = number of periods

Example

Using an example of 10%, five-year annual coupon bond trading at 97.25 with a yield to maturity (YTM) of 10.743%, the duration would be as follows:

	Time Period				
	1	2	3	4	5
Flow	10	10	10	10	110
Present Value @ YTM	9.03	8.15	7.36	6.66	66.05

Using the above, the duration is:

$$\frac{(9.03 \times 1) + (8.15 \times 2) + (7.36 \times 3) + (6.66 \times 4) + (66.05 \times 5)}{9.03 + 8.15 + 7.36 + 6.66 + 66.05}$$

$$\frac{404.3}{97.25} = 4.157 \text{ years}$$

Macaulay duration allows for relative risk comparisons. For example, if the above bond were being compared to another which had a Macaulay duration of 5.2 years, the second bond would be deemed riskier. If interest rates were to go up, the prices of both bonds would fall, but the price of the second bond with the higher Macaulay duration would suffer a larger magnitude price fall. The extent of the price fall, however, is not given by Macaulay duration.

5.2 Modified Duration

Modified duration is a measure of the sensitivity of a bond's price to changes in its yield to maturity or interest rate changes. More specifically, modified duration provides an estimate of how much a bond's price will change in response to a 1% change in its yield. For example, if a bond has a modified duration of 5, a 1% increase in interest rates would result in an approximate 5% decrease in the bond's price.

5.2.1 Modified Duration Formula

$$\frac{\text{Macaulay duration}}{1 + \text{YTM}} = \text{Modified duration}$$

Using the example from above:

$$\text{Modified duration} = \frac{4.157}{1 + 0.10743} = 3.753$$

As the modified duration is derived from the Macaulay duration, it shares the same properties.

- **Longer dated bonds** will have higher modified durations.
- **Lower coupon bonds** will have higher modified durations.
- **Lower yields** will give higher modified durations.

The higher the modified duration, then the greater the sensitivity of that bond to a change in the yield.

Exercise 2.6

A bond is currently priced at £97.25 and has a modified duration of 3.753. What would be the price of the bond if yields increase by 1%?

Solution

Given the modified duration of 3.753, we can say that if yields go up by 1%, the price of the bond will decrease by 3.753% due to the inverse relationship between yields and bond prices.

The decrease in absolute terms is therefore £3.65 (3.753% of £97.25).

The new price of the bond is £93.60 (£97.25 – £3.65).

5.2.2 Limitations of Modified Duration

Modified duration assumes that interest rate changes are parallel, meaning that all yields across different maturities change by the same amount. In reality, yield curve shifts can be more complex, but modified duration provides a useful approximation for small changes in interest rates. It has limitations, however, when dealing with large interest rate movements.

Another limitation with modified duration is that it assumes a linear relationship between a bond's price and changes in interest rates meaning that for a given change in interest rates, the bond's price change is proportional and constant. However, in reality, the relationship between bond prices and interest rates is not purely linear but convex as shown below. The problem with modified duration is that it tends to underestimate the price increase when interest rates fall and overestimate the price decrease when interest rates rise. Modified duration, as can be seen in the diagram below, always underestimates the true price of the bond.



The straight line gives the relationship predicted by modified duration. The curved element gives the actual relationship between price and yield. The difference between the predicted and actual relationships is due to convexity.

5.3 Convexity

Convexity is a measure that addresses the shortcomings of modified duration. It quantifies the curvature or convex shape of the bond price-yield curve. Convexity provides a more accurate estimate of how a bond's price will change in response to interest rate fluctuations.

Not all bonds have the same degree of convexity. The general rule is that bonds with a higher duration will exhibit the greatest degree of convexity. The calculation of convexity is beyond the scope of this syllabus; however, the following formula can be used to work out the percentage change in a bond's price given its modified duration and convexity statistics:

$$\% \text{ Change in Price} = \left[(-\text{Modified Duration} \times \text{change in yield}) + (0.5 \times \text{Convexity} \times \text{change in yield}^2) \right] \times 100$$

Exercise 2.7

A bond is currently priced at £97.25 and has a modified duration of 3.753 and convexity of 20. What would be the percentage change in the price of the bond if yields increase by 1%?

Solution

Using the formula above, % Change in Price = $[(- 3.753 \times 0.01) + (0.5 \times 20 \times 0.01^2)] \times 100 = - 3.65\%$

This means that the bond's price will decline by 3.65% following a 1% increase in yields.

For bonds with the same duration, it will be the higher coupon bonds that will be the most convex. The reason for this is that the lower coupon bonds will have durations that will change little with the alteration in yield. In the most extreme form, the zero-coupon bond will have a duration equal to its maturity and this will not alter as yields move.

Investors may be prepared to pay for convexity. In a volatile market, the convex bonds at any particular maturity interval will outperform the bonds with lesser convexity.

5.4 Other Risks Associated with Bonds

5.4.1 Credit Risk and Default Risk

Credit risk is a fundamental aspect of bond investing and understanding this risk is crucial for investors seeking to make informed decisions in the fixed-income market. Credit risk, also known as **default risk**, is the probability that the issuer of a bond will fail to meet its financial obligations, specifically, the timely payment of interest and the repayment of principal.

Determinants of Credit Risk

Issuer Creditworthiness	The financial health of the bond issuer is a primary factor. Credit rating agencies assess an issuer's creditworthiness and assign ratings, ranging from 'AAA' (high credit quality) to 'D' (in default). (See credit ratings below).
Financial Metrics	Investors analyse financial statements, debt levels, cash flow and profitability to gauge the issuer's ability to meet its debt obligations.
Economic Conditions	Macroeconomic factors, such as economic growth, interest rates and industry-specific conditions, can impact an issuer's ability to honour its commitments. During economic downturns, credit risk tends to rise as companies may face challenges in servicing debt. Rising interest rates can amplify credit risk, particularly for bonds with variable interest rates.

Credit Ratings

An investor in any form of bond will be keen to know what the issuer's creditworthiness is so as to assess whether the returns are worthwhile in light of the risk to their interest and capital. Generally speaking, bonds issued by governments are regarded as the most secure; however, it is not unheard of for governments to default on their debts. In any event, it can be difficult for an investor to assess the creditworthiness of either a government or a company. In order to help them do so, a number of specialist agencies provide credit ratings using standardised rating scales. Among the most well-known agencies are:

- Moody's
- Standard & Poors
- Fitch Ratings.

If an issuer wishes to be rated (and many do because some investors will simply not buy debt which does not have an independent credit rating attached to it), then they will invite the rating agency to inspect its financial status and operations. The agencies then assign a rating to the issuer and to different debt issues from the same issuer.

The rating agencies consider the following main areas:

- The issuer's current financial strength.
- The financial and commercial management of the organisation.
- The economic and political background in the environment in which the organisation operates.
- Competition in the industry in which the organisation operates.

An issuer's rating can change from time to time, with its own fortunes and those of the environment in which it operates. Ratings generally use a series of letters and numbers, which are available for investors to refer to so that they can understand what they are seeing.

For example, S&P's most secure credit rating is 'AAA' with 'AA' being somewhat less secure, and 'A' and 'A-' being progressively less secure. The permutations are too numerous to set out here, but you should be aware that, for example:

- AAA rated debt is more secure than AA rated debt
- A rated debt is more secure than B rated debt
- B rated debt is more secure than C rated debt.

Investment-Grade Bonds

An investment-grade bond refers to a bond that is considered to have a relatively low risk of default. These bonds are assigned credit ratings of 'BBB-' or higher by major credit rating agencies, such as Standard & Poor's, Moody's, or Fitch.

Investment-grade bonds are viewed as more stable and secure investments compared to bonds with lower credit ratings. The higher credit rating indicates a lower perceived risk of default and, as a result, investors typically demand lower yields on these bonds. Institutional investors, such as pension funds

and insurance companies, often prefer investment-grade bonds because of their lower risk profile, making them a more conservative choice for fixed-income portfolios.

High-Yield Bonds and Credit Risk

- **High-yield (junk) bonds** – bonds with lower credit ratings (below investment grade) offer higher yields to compensate investors for the increased risk. While high-yield bonds can provide attractive returns, they also come with a higher likelihood of default, emphasising the importance of thorough due diligence.
- **Monitoring and mitigating credit risk** – investors should regularly monitor the creditworthiness of bond issuers, as financial conditions can change over time. In addition, building a diversified bond portfolio across issuers, sectors and geographies can help mitigate the impact of individual credit events. Some investors use credit derivatives like credit default swaps (CDS) to hedge against credit risk.

5.4.2 Currency Risk

Currency risk, also known as exchange rate risk, is a significant factor to consider when investing in bonds denominated in a foreign currency. This risk arises from the potential for fluctuations in exchange rates between the currency in which the bond is denominated and the investor's domestic currency. Understanding and managing currency risk is crucial for investors seeking to accurately assess the potential returns and risks associated with their bond investments.

For example, if the foreign currency depreciates against the investor's domestic currency, the cash flows from interest payments and principal repayment, when converted back to the domestic currency, will be lower than expected. Conversely, if the foreign currency appreciates, it can result in higher-than-anticipated cash flows when converted into the domestic currency.

Mitigating Currency Risk

Investors can use hedging strategies to mitigate the impact of currency risk. This may involve using financial instruments like currency forwards or options to offset potential losses due to adverse exchange rate movements. In addition, holding a diversified portfolio of bonds denominated in different currencies can help spread currency risk. This strategy aims to reduce the impact of adverse movements in any single currency.

5.4.3 Call Risk

Call risk, also known as redemption risk, is a significant consideration for investors in callable bonds. Callable bonds give the issuer the right, but not the obligation, to redeem or 'call in' the bonds before their scheduled maturity date. This introduces a level of uncertainty for bondholders. Understanding call risk is essential for investors seeking to make informed decisions about their bond portfolios.

Issuers typically call bonds when prevailing interest rates are lower than the coupon rate on the callable bonds. By redeeming existing higher-yielding bonds and issuing new bonds at lower rates, issuers can reduce their interest expenses. Bondholders face the risk that their bonds may be called before the

expected maturity date. This can disrupt investment plans, particularly if the investor was relying on a steady stream of interest income from the bond.

Investors should therefore carefully review the terms and conditions of callable bonds before investing. Understanding the call provisions, call schedule and potential call triggers is crucial. Investors may prioritise bonds with higher yields to compensate for the risk of early redemption as higher yields can provide a buffer against potential losses from call risk.

5.4.4 Reinvestment Risk

Reinvestment risk is a concept that becomes particularly relevant for bond investors when interest rates are on a downward trend. This risk centres around the concern that the cash flows generated from a bond, such as interest payments and the return of principal, may need to be reinvested at lower interest rates than those prevailing at the time of the original investment. This can result in a reduction in the overall yield and income potential for the investor. Other factors to consider include:

- **Yield curve dynamics** – in an environment of falling interest rates, the yield curve may flatten, meaning that the difference in yields between short-term and long-term investments narrows. This can limit attractive reinvestment options, particularly for longer-term bonds.
- **Duration and sensitivity** – duration, a measure of a bond's sensitivity to interest rate changes, is crucial in assessing reinvestment risk. Longer-duration bonds are more sensitive to changes in interest rates, magnifying the impact of reinvestment risk.

In terms of mitigating reinvestment risk, diversifying the bond portfolio with bonds of varying maturities can help. A mix of short-term and long-term bonds may provide flexibility in navigating changing interest rate environments. Bond laddering strategies that involve holding bonds with staggered maturities could also be used as a risk mitigation strategy. This approach allows for a consistent stream of cash flows and provides the flexibility to reinvest in different interest rate environments.

Changes in economic conditions, monetary policy, and inflation rates can influence interest rate movements. Staying informed about these factors is critical for anticipating potential shifts in reinvestment risk.

End of Chapter Questions

Think of an answer for each question and refer to the appropriate section for confirmation.

1. **What are zero-coupon bonds, and how do they differ from traditional bonds in terms of interest payments and pricing?**

Answer reference: Section 2.1.3

2. **How does the decision to call bonds relate to prevailing interest rates in the market, and what risks do bondholders face, particularly when interest rates are falling?**

Answer reference: Section 2.1.5

3. **Explain the role of trigger mechanisms in CoCo bonds.**

Answer reference: Section 2.1.7

4. **What are the key differences between Eurobonds and domestic bonds, particularly in terms of currency denomination and the locations where they can be issued?**

Answer reference: Section 2.1.10

5. **What are some examples of projects funded by blue bonds, and how do they contribute to the preservation of marine ecosystems and coastal areas?**

Answer reference: Section 2.1.12

6. **Explain the concept of the market discount rate in bond valuation and its significance in determining the present value of a bond's future cash flows?**

Answer reference: Section 3.1

7. **Explain the relationship between the discount rate and a bond's trading price in relation to its par value and coupon rate?**

Answer reference: Section 3.1

8. **What are the main sources of investment return for bondholders?**

Answer reference: Section 3.2

9. **What are the key characteristics and limitations of the yield-to-maturity (YTM) as a measure of return for bonds?**

Answer reference: Section 3.2.2

10. **How are spot rates used to calculate the present value of bond cash flows, and why is this approach considered more appropriate for bonds with multiple cash flows at different maturities?**

Answer reference: Section 3.3

11. **When and why is matrix pricing a useful approach in bond valuation?**

Answer reference: Section 3.4

12. **Describe the relationship between bond prices and interest rates?**

Answer reference: Section 3.5

13. **How does the sensitivity of bond prices to changes in interest rates differ between longer-dated and shorter-dated bonds?**

Answer reference: Section 3.6

14. Explain the relationship between bond price sensitivity and the level of coupons paid.

Answer reference: Section 3.7

15. Explain the crossover method for valuing convertible securities.

Answer reference: Section 4.1

16. How does the option pricing method for valuing convertibles differ from the crossover method and why is it considered a more appropriate method for valuing convertibles?

Answer reference: Section 4.2

17. How is the value of a convertible bond calculated at its date of expiry, and what components contribute to this valuation?

Answer reference: Section 4.2.2

18. What factors determine the value of an option?

Answer reference: Section 4.2.1

19. What is meant by the conversion premium?

Answer reference: Section 4.2.6

20. Explain what is meant by Macaulay duration and how it is calculated.

Answer reference: Section 5.1

21. Explain what is meant by modified duration.

Answer reference: Section 5.2

22. Explain what is meant by convexity and the role it plays in bond pricing?

Answer reference: Section 5.3

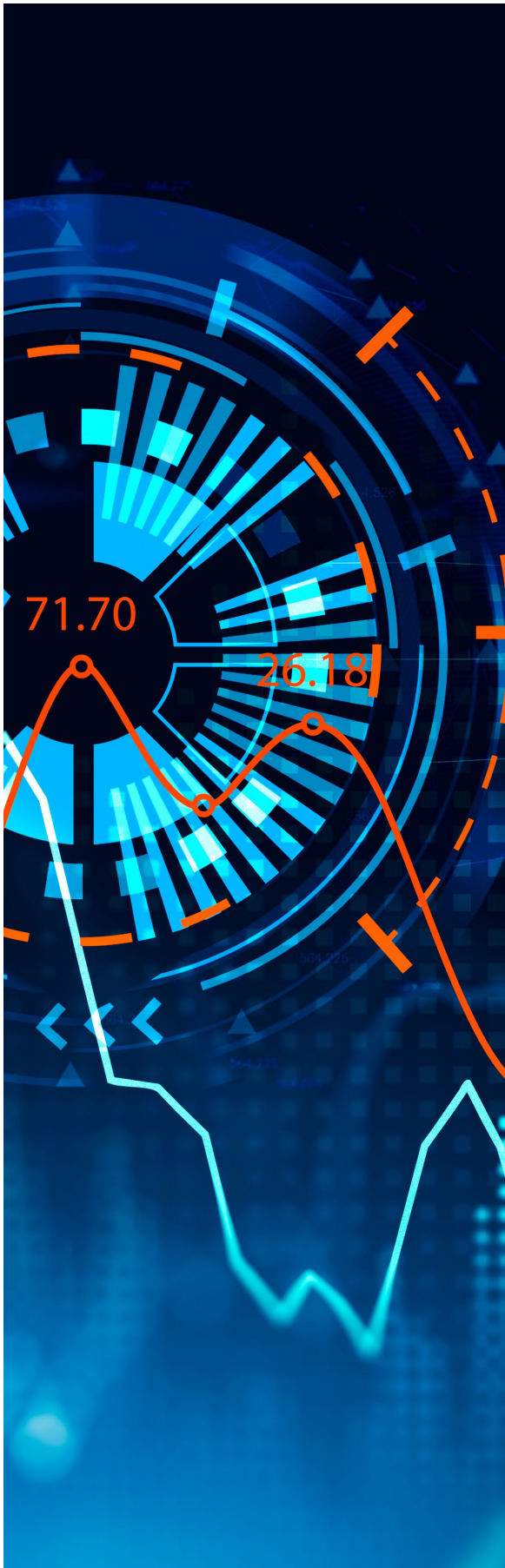


Chapter Three

Alternative Sources of Finance

Introduction	81
1. Alternative Sources of Finance	82
2. Appropriateness of Finance for Different Business Scenarios	91

This syllabus area will provide approximately 2 of the 40 examination questions



Introduction

Meeting the financing needs of a new business venture, supporting the expansion of an early-stage project or stabilising a company in financial distress all require access to appropriate sources of capital. Traditionally, equity, banks and debt instruments have formed the foundation of corporate finance. However, the modern financial environment offers a far wider set of options. A diverse range of alternative sources of finance has emerged, each with distinct characteristics, advantages and limitations. In addition to funds raised through the equity capital markets (ECM) and debt capital markets (DCM), businesses today can access numerous other financing channels that may be better suited to their specific circumstances.

This chapter provides an overview of these alternative sources of finance as well as their characteristic, special features, advantages and disadvantages. The specific sources of finance considered in this chapter include, private equity, **venture capital**, angel finance, crowdfunding, private placements, Enterprise Investment Schemes (EISs), banks, **leases**, project finance, **sovereign wealth funds (SWFs)**, **family offices** and senior and **mezzanine debt**.

The chapter then goes on to provide examples of circumstances under which the various sources may be appropriate for a new start up, an early stage project, developmental capital, a management buy-out or buy-in, a reorganisation or turnaround and a public company.

1. Alternative Sources of Finance

Learning Objective

- 3.1.1 Know the characteristics, special features, pros and cons of the following sources of finance: Private equity and venture capital (including venture capital trusts (VCTs)), angel finance and crowd funding; private placings; Enterprise Investment Schemes (EISs); banks; leases; project finance; senior, mezzanine and other debt; sovereign wealth funds; government-backed finance; family offices

1.1 Private Equity and Venture Capital, Venture Capital Trusts (VCTs), Angel Finance and Crowdfunding

Private equity (PE) and venture capital (VC) represent equity financing options, where investors provide capital in exchange for ownership shares. PE typically targets mature companies with established cash flows, aiming to enhance their operations and profitability. VC, conversely, focuses on high-growth startups with the potential for significant returns. Venture Capital Trusts (VCTs) are unique to the UK, offering tax incentives to investors who support small, high-risk companies. Angel investors are individual investors who often contribute not just capital but also industry-specific expertise, mentorship, and valuable networks. Crowdfunding **leverages** online platforms to gather funds from a diverse group of investors, either through equity crowdfunding (backers receive shares) or rewards-based crowdfunding (backers receive products or services).

Equity financing doesn't necessitate immediate repayment, offering breathing room for startups and businesses in need of cash flow flexibility. VC and angel investors bring not only financial support but also invaluable guidance, industry insights, and networking opportunities. Crowdfunding can engage a broad community of backers, generating public interest and potential brand advocates.

Equity financing, however, dilutes ownership and can lead to a loss of control. VC and angel investors often have high return expectations, which can create tension over decision-making and company direction. Crowdfunding success depends on effectively marketing the campaign and attracting a sufficient number of backers, which may not be guaranteed.

1.2 Private Placings

Private placements represent a financing method where companies sell securities, such as shares or bonds, to a carefully selected group of investors without the need for a public offering. This approach offers a valuable alternative for raising capital while avoiding the extensive regulatory requirements typically associated with public offerings.

One notable advantage of private placements is the enhanced flexibility they provide in structuring deals compared to the more rigid structures of public offerings. These placements are often executed with institutional investors or high-net-worth individuals, allowing for tailored arrangements that suit the company's specific needs.

Moreover, private placements alleviate the regulatory burden significantly, enabling companies to design offering terms that align with their financial objectives. This streamlined process not only saves time but also provides a quicker capital-raising option compared to the often time-consuming procedures associated with public offerings. This can be especially advantageous for businesses requiring rapid access to funds to seize strategic opportunities or address urgent financial needs.

However, it's important to note that private placements do come with certain limitations. One notable restriction is the constrained pool of potential investors limited to those who meet specific criteria or possess pre-existing relationships with the issuing company. Consequently, access to funds may be limited to a select group. Additionally, securities issued through private placements typically have lower liquidity compared to publicly traded ones, which can affect the ease of trading or selling these securities in secondary markets. Businesses considering private placements should carefully weigh these factors against the advantages of flexibility and reduced regulatory burdens offered by this financing option.

1.3 Enterprise Investment Schemes (EISs)

Enterprise Investment Schemes (EISs) are UK government-backed programs designed to stimulate investment in small, high-risk companies. EISs offer tax incentives to investors in such businesses.

EISs provide substantial tax relief to investors, including income tax relief, capital gains tax relief, and inheritance tax relief. These incentives make EISs appealing to investors looking to mitigate their tax liabilities.

The key points to note about the scheme are as follows.

- It must be an investment by an individual in equity shares.
- The company cannot be listed (although AIM companies will qualify).
- The company must be engaged in a 'qualifying trade', which excludes, for example, accountancy, banking and other financial services and property companies.
- The maximum investment in any one year by an individual is £1 million (or £2 million if anything above £1 million is invested in 'knowledge intensive' companies).
- Income tax relief will only be given at a rate of 30%.
- The shares must be held for at least three years. If the shares are sold within the three-year period, any tax relief received will be **clawed back**.
- The investor must not be connected to the company. In essence, this means they must not directly or indirectly control more than 30% of the share capital.

The maximum amount that can be raised by an individual company under the EIS scheme is £5 million (or £10 million if it is a 'knowledge intensive' company). Over the company's lifetime, the maximum it can raise through EIS funding is £12 million (or £20 million for 'knowledge intensive' companies).

EISs significantly reduce the cost of capital for small businesses by attracting investors with attractive tax incentives. This makes them an attractive option for startups and high-risk ventures in need of capital.

1.4 Seed Enterprise Investment Scheme (SEIS)

The aim of the scheme is to provide new sources of finance for smaller, newly formed companies, where traditional sources of finance (eg, bank debt) might be less readily available. In return, investors obtain a tax refund of half their investment. Specifically:

- the scheme gives income tax relief at 50% in respect of qualifying SEIS shares up to an annual maximum investment of £200,000, and there is no tax relief on income from dividends.
- the investment is exempt from capital gains tax, as long as SEIS shares are sold more than three years after they are issued.

The investor can be a director of the company, but the investor must not be connected to the company (ie, they must not directly or indirectly control more than 30% of the share capital).

There are significant restrictions on the company receiving the investment, including:

- the maximum overall amount which can be raised through SEIS is £250,000
- the gross assets must not exceed £350,000
- maximum number of 25 full-time employees, and
- qualifying trade only (not a finance or investment company).

1.5 Banks

Banks provide traditional debt financing options, extending loans to businesses with specified terms, interest rates, and repayment schedules.

In the UK, businesses have access to various types of loans from banks, including working capital loans, **term loans**, and revolving credit facilities. The British Business Bank is a development bank wholly owned by the UK government that supports small businesses by facilitating access to finance.

Banks are reliable sources of funding, often providing loans with lower interest rates compared to some alternative financing channels. Establishing a banking relationship can be advantageous for future financing needs.

Banks typically maintain stringent credit standards, which can pose challenges for startups or businesses with limited credit histories. Moreover, banks often require collateral, and failure to meet repayment obligations can result in severe consequences, including asset seizure.

1.6 Leases

Leases allow businesses to utilise assets, such as equipment or property, without actual ownership. Instead, businesses make periodic payments to the asset's owner.

Leases can take the form of operating leases or finance leases. A finance lease is generally one where the lessee effectively takes on the risks and rewards of ownership, such as responsibility for maintenance and usage over substantially all of the asset's estimated useful life. An operating lease is more like a

rental – shorter term relative to asset life, with less transfer of risks and rewards of ownership and the lessor retaining more of the responsibilities for maintenance and servicing.

Leasing conserves capital as businesses are not obliged to make substantial upfront purchases. It also provides access to assets that might otherwise be financially out of reach and may offer tax advantages through deductions for lease payments.

Over time, leasing can prove costlier than outright ownership, with cumulative payments potentially exceeding the asset's value. Leases often entail restrictions on asset utilisation and may necessitate businesses to maintain the leased assets. Under **IFRS 16**, most leases are capitalised on the balance sheet, requiring recognition of a right-of-use asset and a corresponding lease liability. This effectively treats leases in a similar way to asset ownership financed by debt, impacting both the balance sheet and key financial ratios.

Some entities may wish to engage in an arrangement called a '**sale and leaseback**'. The entity may have a significant amount of its net worth represented by non-current assets used in its commercial activities, such as factories or a head office. It may choose to sell one or more of its properties to a property company or bank, and then lease it from the new owners. This will have the effect of raising an immediate cash sum, although the cost of leasing the property back will dilute earnings in future years.

A company might choose to enter into a sale and leaseback agreement when:

- it is seeking to raise cash to repay debt. It will seek to ensure that the leasing costs are lower than the interest on the debt repaid, or
- it wishes to raise cash for an expansion of the business, or to improve a long-term liquidity position.

1.7 Project Finance

Project finance is centred around specific ventures or initiatives, such as infrastructure development (eg, building a highway or a power plant), renewable energy projects (eg, wind farms or solar installations), or large-scale industrial projects (eg, mining or petrochemical facilities). Typically, a separate legal entity, often called a special purpose vehicle (SPV) or project company, is created solely for the purpose of the project. This entity is responsible for managing the project's finances and operations. Project finance structures effectively isolate the project's financial risks from the sponsoring company's **balance sheet**. This means that if the project encounters financial difficulties or fails, it generally doesn't impact the overall financial health of the **parent** company. Funding for the project is secured based on the project's dedicated revenue streams, collateral or project-specific assets. The project's assets may serve as security for the loans obtained.

1.7.1 Advantages

- **Risk Mitigation** – project finance spreads risks among multiple stakeholders, reducing the financial risk borne solely by the parent company. This can attract investors interested in specific projects but wary of broader corporate risk.
- **Large-scale Projects** – it enables businesses to undertake large-scale, capital-intensive projects without incurring excessive corporate debt, which could affect their creditworthiness.

- **Access to Expertise** – project finance often involves partnerships with specialists in various fields, such as legal, financial, and engineering experts, which can enhance the chances of successful project execution.
- **Ownership Transfer** – provisions in project finance agreements may allow lenders or investors to assume ownership or control of the project if certain conditions, like a default, are not met.

1.7.2 Disadvantages

- **Complexity** – structuring project finance deals can be intricate, requiring significant expertise and resources. Transaction costs, particularly in due diligence and legal documentation phases, can be substantial.
- **Limited Recourse** – while limited recourse can be an advantage, it can also make project finance more expensive, as lenders demand higher interest rates to compensate for the increased risk.
- **Risk of Default** – if a project underperforms or faces unexpected challenges, it can lead to defaults, potentially resulting in the loss of project assets.
- **Investor Attraction** – smaller projects or those with less straightforward revenue streams may struggle to attract sufficient investment interest due to the complexity of project finance structures.

1.7.3 Steps Involved

1. **Project Identification** – a company identifies a large-scale project that requires substantial funding, often beyond its own balance sheet capacity.
2. **Special Purpose Vehicle (SPV) Creation** – a separate legal entity, the SPV or project company, is established to manage the project's finances and operations. The SPV is often funded by a combination of equity from the parent company and debt from external lenders.
3. **Funding Acquisition** – the SPV secures funding through various means, such as loans, bonds, or equity investments. Lenders and investors evaluate the project's financial viability and potential risks.
4. **Project Execution** – the project is executed by the SPV, utilising the secured funds to build, operate, and maintain the project. Cash flows generated by the project are used to repay debt and provide returns to equity investors.
5. **Risk Management** – throughout the project's lifecycle, various risk management strategies are employed to ensure its financial stability, including insurance, contract structures, and contingency plans.
6. **Completion and Handover** – once the project is completed and operational, it may be transferred back to the parent company or retained as a separate entity, depending on the terms of the project finance agreement.

1.8 Senior, Mezzanine, and Other Debt

Debt financing entails borrowing capital with the commitment to repay it, along with interest, over a predetermined duration.

Debt financing can be categorised into senior debt (with the highest repayment priority), mezzanine debt (combining elements of debt and equity), and other debt instruments, such as convertible debt.

Debt financing does not involve ownership dilution, enabling businesses to retain control. Interest payments on debt are often tax-deductible, reducing the overall cost of capital. Debt allows businesses to leverage existing assets and generate returns greater than the cost of borrowing.

Debt obliges regular interest and principal repayments, which can strain cash flow, particularly if the business encounters financial difficulties. Defaulting on debt carries severe repercussions, including legal proceedings and damage to credit ratings. Additionally, businesses must consider the impact of debt on their **debt-to-equity ratios** and overall financial risk.

1.8.1 Senior Debt

Senior debt will be supplied by banks on a secured basis. In order to assess the debt capacity of the company, banks will look at ratios such as the following:

- **interest cover**, both on a profits and cash flow basis
- the ratio of **free cash flow** to total debt repayments (interest + scheduled capital repayments)
- the ratio of total debt to **EBITDA**.

1.8.2 Mezzanine Finance

Mezzanine finance is financing that ranks below senior debt for repayment and interest payment, but ahead of equity. It usually takes the form of a loan from a bank or specialist finance house or venture capital firm, at a higher interest rate than the senior debt and with lower or subordinated security. Frequently it will include an 'equity kicker'. This is an entitlement for the lender to take an equity stake in the venture capital investment, usually through the issue of **warrants** exercisable on the venture capitalist's exit or on repayment of the mezzanine debt.

Mezzanine finance is often part of the funding mix for a buyout. It is popular because debt is inherently cheaper than equity as the interest charge is tax-deductible, and equity providers always seek the maximum leverage compatible with the risk profile of the company, to maximise the returns on equity.

Generally, the team will first establish the maximum amount of senior debt available, based on interest cover and in some cases asset backing. The next step is to establish whether any mezzanine debt can be raised. This will be determined by the attitude of the senior lender, who will have imposed restrictions on the company's overall borrowings in the form of **gearing** covenants and (most importantly) overall interest cover covenants.

Example

Newco Limited is forecasting EBIT of £1.5m for the current financial year. The senior lender has imposed a senior interest cover of 3x and overall interest cover of 2.0x. Interest rates on secured debt are currently 10%.

The maximum amount of senior debt can be calculated, as interest cannot exceed one third of EBIT of £1.5m. Thus, the maximum interest that can be paid on the senior debt is £500,000. With interest rates at 10%, the maximum senior debt available is £5m.

The maximum mezzanine debt can now be calculated. Total interest cannot exceed half of EBIT of £1.5m, ie, £750,000. Of this, £500,000 is being paid to the senior lender, so we have surplus interest capacity of £250,000. Mezzanine debt is typically 3%–4% more expensive than senior debt – say, 14%. The maximum mezzanine debt available is therefore £250,000 @ 14% = £1.786m.

1.8.3 High Yield Debt

High yield bonds, often referred to as 'junk bonds', are corporate bonds with lower credit ratings compared to investment-grade bonds. These bonds are issued by companies that have a higher risk of defaulting on their debt payments. As a result, they offer higher interest rates or yields to compensate investors for the increased risk. Key characteristics include:

- **Lower Credit Ratings** – high yield bonds are typically rated below investment grade by credit rating agencies like Moody's, S&P, or Fitch Ratings. These ratings indicate a higher risk of default compared to bonds with higher credit ratings.
- **Higher Yields** – because of the increased risk associated with these bonds, issuers offer higher interest rates or yields to attract investors. These higher yields make high yield bonds attractive to income-seeking investors looking for greater potential returns.
- **Diverse Issuers** – high yield bonds can be issued by a wide range of companies, including those in industries such as telecommunications, energy, technology, and healthcare. They are often used by companies with lower creditworthiness to raise capital for various purposes, including expansion, acquisitions, or debt refinancing.
- **Higher Price Volatility** – high yield bonds tend to have more price volatility compared to investment-grade bonds. Changes in market conditions, economic factors, or issuer-specific developments can impact the bond's price.
- **Risk of Default** – one of the primary risks associated with high yield bonds is the risk of default. Issuers may struggle to meet their interest or principal payments, leading to potential losses for bondholders.
- **Diverse Maturities** – high yield bonds can have different maturity periods, ranging from several years to decades. Investors can choose bonds with maturities that align with their investment goals and risk tolerance.

1.9 Sovereign Wealth Funds

Sovereign wealth funds (SWFs) are state-owned investment entities that vary in their investment strategies and objectives. SWFs often originate from the foreign exchange reserves of the government and are used to generate returns on these assets.

SWFs can invest in a wide range of assets globally, including equities, real estate, infrastructure, and bonds. They are often viewed as long-term investors and may possess substantial financial resources.

Sovereign wealth funds can provide substantial amounts of long-term capital, making them particularly valuable for extensive infrastructure projects, investments in strategic sectors, or economic stabilisation measures. SWFs may also have a longer investment horizon than private investors, which can be advantageous for businesses with long-term growth strategies.

Investment decisions within sovereign wealth funds, however, may be influenced by political considerations, introducing potential risks associated with changes in government policies or international relations. Additionally, there may be limited transparency regarding the fund's investments and objectives, which can lead to concerns about accountability and alignment with national interests.

1.10 Family Offices

Family offices are private wealth management firms or entities that serve high-net-worth individuals (HNWIs) and affluent families. These entities provide comprehensive financial services and strategic guidance tailored to the specific needs and objectives of their clients. The primary purpose of a family office is to oversee and manage the financial affairs, investments and assets of a wealthy individual or family. Key features include:

- **Holistic Wealth Management** – family offices offer a wide range of financial services, including investment management, estate planning, tax optimisation, philanthropic strategies and risk management. They take a comprehensive approach to managing a client's financial life.
- **Customised Solutions** – services provided by family offices are highly personalised to meet the unique goals and preferences of the client. This includes crafting investment strategies, developing estate plans and addressing specific financial concerns.
- **Asset Management** – family offices often handle the management of various types of assets, including shares, bonds, real estate, private equity and alternative investments. They aim to grow and preserve the client's wealth over the long term.
- **Investment Expertise** – family offices typically have a team of experienced investment professionals who analyse investment opportunities, monitor portfolios and make informed investment decisions on behalf of their clients.
- **Estate and Succession Planning** – family offices help clients plan for the transfer of wealth to the next generation or charitable causes. They assist in structuring trusts, creating wills and minimising estate taxes.
- **Philanthropic Services** – many family offices assist clients in managing their philanthropic endeavours. They can help identify charitable causes, establish charitable foundations, and manage donations.
- **Confidentiality and Privacy** – family offices prioritise the confidentiality and privacy of their clients. They operate discreetly and maintain strict confidentiality standards.

- **Multi-Generational Support** – family offices often serve multiple generations of a wealthy family, ensuring that the family's financial legacy is passed down successfully.
- **Cost Efficiency** – while family offices can be costly to establish and maintain, they can help HNWIs and families achieve cost efficiencies through effective financial planning and investment strategies.

Family offices can be either single-family offices, which exclusively serve one affluent family, or multi-family offices, which cater to the financial needs of multiple families. The choice between a single-family and multi-family office depends on the client's wealth, complexity of financial affairs and desire for privacy.

1.11 Government-Backed Finance

Government-backed financial institutions and programmes play an increasingly strategic role in business finance, particularly in reducing the cost of capital and addressing market gaps where private funding alone may be insufficient. These initiatives support small and medium-sized enterprises (SMEs), innovation, infrastructure development and the transition to green energy. They typically operate through credit guarantees, concessional loans with below-market interest rates, direct equity investments or blended finance structures designed to attract private capital alongside public commitments.

In the United Kingdom, the recently created National Wealth Fund is focused on strategic investments in clean energy, advanced manufacturing and regional development, reflecting the government's industrial and net-zero policy priorities. The British Business Bank plays a complementary role by improving SME access to finance. It operates programmes such as the Business Growth Partnership, which co-invests alongside private equity funds, and the Enterprise Capital Funds, which provide equity finance for early-stage, high-growth companies.

Internationally, many countries have established similar mechanisms to stimulate entrepreneurship and economic resilience. In the United States, the Small Business Administration (SBA) operates loan guarantee programmes that encourage private lenders to extend credit to SMEs. Canada's Small Business Financing Program (CSBFP) provides comparable support by de-risking SME lending through government-backed guarantees. Singapore has created Startup SG, which offers grants, loans, and co-investment opportunities for early-stage businesses, while its sovereign wealth fund Temasek invests in strategic sectors such as technology, healthcare and sustainable infrastructure. Germany's development bank KfW remains one of the world's leading examples of government-backed finance, providing subsidised loans and equity finance for innovation, sustainability and export competitiveness. In India, the Small Industries Development Bank of India (SIDBI) plays a central role in supporting micro, small and medium-sized enterprises through lending, guarantees, and venture capital funding. In the United Arab Emirates, the Emirates Development Bank (EDB) and Mubadala Investment Company provide finance to diversify the economy away from hydrocarbons, focusing on industrial development, renewable energy and innovation.

These government-backed institutions and programmes are not only designed to lower financing barriers for businesses but also to align capital flows with national priorities such as job creation, technological advancement, climate transition and long-term economic resilience.

2. Appropriateness of Finance for Different Business Scenarios

Learning Objective

- 3.2.1 Understand the circumstances under which alternative sources of finance will be deemed appropriate for: a new start up; an early stage project; developmental capital; a management buy-out or management buy-in; a re-organisation or turnaround; a public company

2.1 A New Startup

- **Private Equity and Venture Capital** – these equity financing options are well-suited for startups with high growth potential, as they not only provide capital but also valuable mentorship and industry connections, facilitating growth and market entry.
- **Crowdfunding** – crowdfunding, whether through equity-based or rewards-based platforms, can be appropriate for startups with innovative concepts looking to raise capital and engage a broad community of supporters.

2.2 An Early-Stage Project

- **Private Equity and Venture Capital** – these sources of equity financing are appropriate for early-stage projects with the potential for significant expansion and scaling.
- **Crowdfunding** – similar to startups, early-stage projects with unique or socially impactful propositions can utilise crowdfunding to gather support and funds from a diverse group of backers.

2.3 Developmental Capital

- **Private Equity and Venture Capital** – established companies seeking expansion, market diversification, or innovation can benefit from private equity and venture capital to finance developmental initiatives.
- **Project Finance** – businesses pursuing large-scale developmental projects, such as infrastructure or renewable energy ventures, can employ project finance to secure dedicated funding and mitigate risk.

2.4 A Management Buy-Out or Management Buy-In

Management Buyout (MBO) and **Management Buy-In (MBI)** are both strategies involving the acquisition of a company, but they differ in terms of the individuals or groups leading the acquisition.

- **Management Buyout (MBO)** – in an MBO, the existing management team of a company, often including key executives or managers, acquires a controlling stake or full ownership of the business. The buyers are typically internal, consisting of current employees, executives or managers who have a deep understanding of the company's operations and industry. The goal of an MBO is usually to provide existing management with the opportunity to take control of the company, possibly to implement strategic changes, improve performance or pursue growth opportunities.

- **Management Buy-In (MBI)** – in an MBI, external individuals or a group of investors acquire a company, bringing in a new management team to run the business. The buyers in an MBI are external to the company and often consist of entrepreneurs, investors or other professionals with the expertise and vision to lead the acquired business. MBIs are often pursued when a company needs new leadership to drive a turnaround, capitalise on untapped potential or bring about a change in strategic direction.
- **Private Equity** – private equity can be instrumental in facilitating management buyouts (MBOs) by providing the necessary capital for existing management teams to acquire a business they are already familiar with.

2.5 Re-organisations or Turnarounds

- **Debt Financing** – debt financing can provide essential capital for businesses undergoing restructuring or turnaround efforts, helping them address financial challenges and return to profitability.
- **Sovereign Wealth Funds** – in cases of large-scale reorganisations with government involvement, sovereign wealth funds may provide the substantial capital required to implement strategic changes and stabilise the economy.

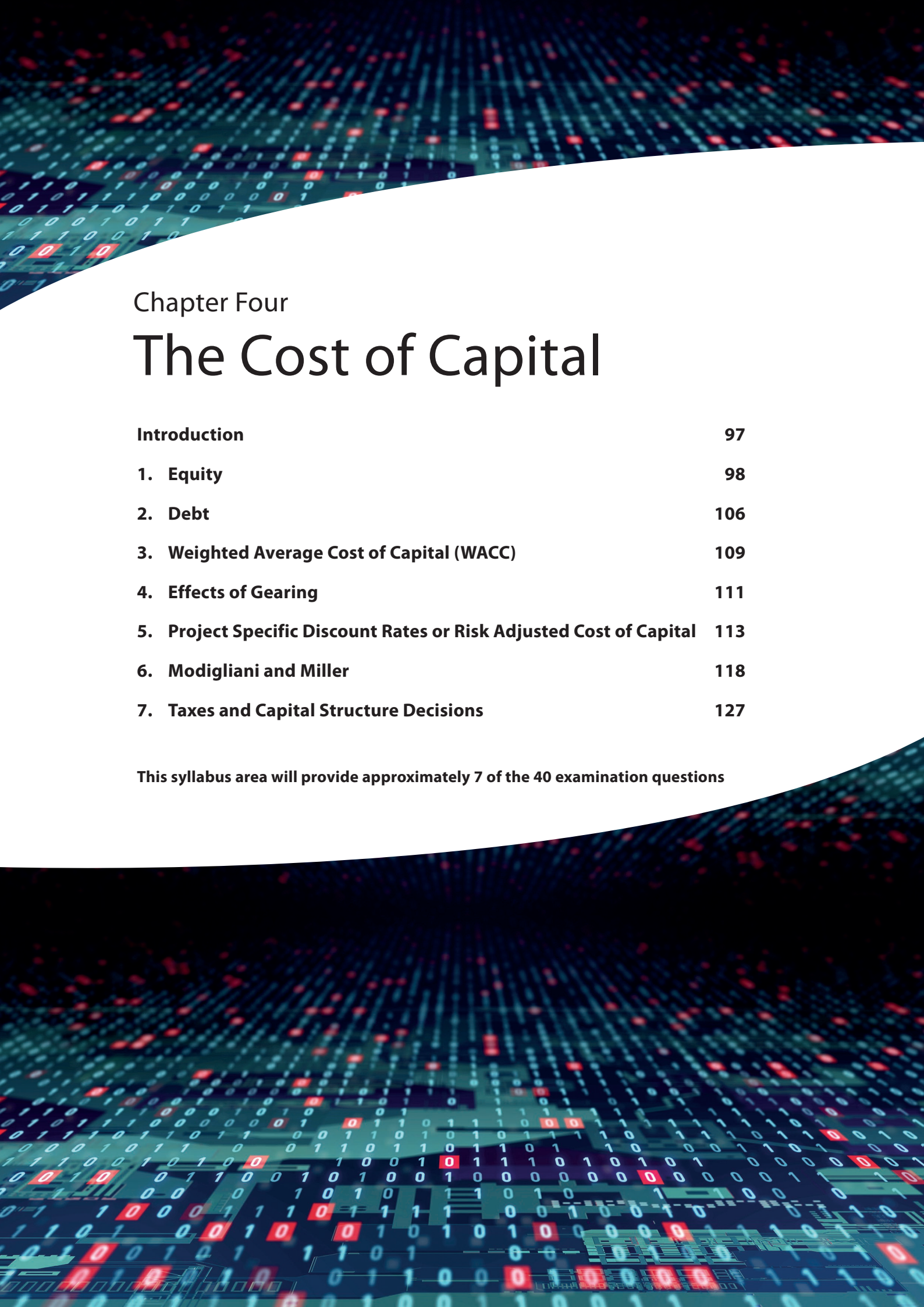
2.6 Public Companies

- **Private Equity** – public companies can engage private equity firms for strategic investments, acquisitions, or buyouts to enhance their operations and generate value for shareholders.
- **Banks** – public companies have access to a wide range of financial products from banks, including debt financing, working capital lines and treasury management services.
- **Sovereign Wealth Funds** – for large public companies requiring substantial capital injections for strategic initiatives or international expansions, sovereign wealth funds can be a valuable source of long-term funding.

End of Chapter Questions

Think of an answer for each question and refer to the appropriate section for confirmation.

1. **Explain the key differences between private equity (PE) and venture capital (VC) in terms of their target companies and objectives.**
Answer reference: Section 1.1
2. **What distinguishes private placements from public offerings, and why do companies opt for private placements as a financing method?**
Answer reference: Section 1.2
3. **What are the key criteria for a company to qualify for the Enterprise Investment Scheme (EIS) in the UK, and what are the maximum investment limits for individuals under this scheme?**
Answer reference: Section 1.3
4. **What are the main benefits for investors under the Seed Enterprise Investment Scheme (SEIS) in the UK, and what are the key criteria that companies must meet to qualify for SEIS funding?**
Answer reference: Section 1.4
5. **What are the primary advantages of leasing for businesses, and what are the potential drawbacks associated with long-term leasing arrangements?**
Answer reference: Section 1.6
6. **What is the primary purpose of creating a Special Purpose Vehicle (SPV) in project finance, and how does it contribute to risk mitigation for the parent company?**
Answer reference: Section 1.7
7. **What distinguishes high yield bonds from investment-grade bonds, and why do issuers offer higher interest rates or yields for high yield bonds?**
Answer reference: Section 1.8.3
8. **What are the potential advantages and disadvantages associated with sovereign wealth funds in terms of their impact on long-term investments, economic stability, and political factors?**
Answer reference: Section 1.9
9. **Identify four features and services provided by family offices?**
Answer reference: Section 1.10
10. **What factors might influence a client's choice between a single-family office and a multi-family office?**
Answer reference: Section 1.10



Chapter Four

The Cost of Capital

Introduction	97
1. Equity	98
2. Debt	106
3. Weighted Average Cost of Capital (WACC)	109
4. Effects of Gearing	111
5. Project Specific Discount Rates or Risk Adjusted Cost of Capital	113
6. Modigliani and Miller	118
7. Taxes and Capital Structure Decisions	127

This syllabus area will provide approximately 7 of the 40 examination questions



Introduction

The concept of cost of capital lies at the heart of corporate finance, guiding the allocation of resources, investment choices and the overall financial strategy of a company.

The cost of capital refers to the cost a company incurs to finance its operations and fund its various investments. It represents the required rate of return that an investor, whether it's a shareholder or a lender, expects in exchange for providing funds to the company. In essence, it's the price a company pays to use external sources of capital.

The cost of capital takes into account the returns expected by both equity investors (shareholders) and debt investors (lenders or bondholders). It's a critical financial concept because it influences a company's financial decisions, such as investment choices, capital budgeting, and capital structure.

There are typically two primary components of the cost of capital:

1. **Cost of Equity (K_E)** – this represents the return expected by the company's shareholders. It is the cost associated with the use of equity capital, and it's often estimated using models like the Dividend Growth Model (DGM) and the **Capital Asset Pricing Model (CAPM)**.
2. **Cost of Debt (K_D)** – this represents the cost of borrowing funds through debt instruments such as loans or bonds. It considers the interest rate paid to debt holders and takes into account factors like the company's creditworthiness and the prevailing market interest rates.

In addition to equity and debt, a company's cost of capital can also include other sources of financing, such as preferred stock or any other form of financing with an associated cost.

The weighted average of the cost of equity and the cost of debt, adjusted for the company's capital structure (the proportion of debt and equity), is known as the **Weighted Average Cost of Capital**

(WACC). The WACC reflects the blended cost of all capital sources and is a critical parameter used in various financial analyses, including evaluating the feasibility of investment projects, assessing the attractiveness of potential mergers and acquisitions, setting hurdle rates for capital budgeting decisions and determining the company's valuation in financial markets.

This chapter begins with the cost of equity. Both DGM and CAPM are considered. The focus then moves to the calculation of the cost of debt (both redeemable and irredeemable debt) and the effect of taxation on the cost of debt. Once this is done, the chapter looks at the overall cost of capital in the form of the weighted average cost of capital (WACC). The final section looks at capital structure decisions including and analysis of how gearing can affect the cost of equity and debt. Equity and asset **betas** are considered with a view to calculation project specific discount rates. Modigliani and Miller's theory on capital structure and the assumptions behind the theory both with and without taxation are then explored. The section ends with a discussion on the effect of taxes on capital structure decisions.

1. Equity

Learning Objective

- 4.1.1 Understand the assumptions, pros and cons of the dividend growth model
- 4.1.2 Be able to analyse the cost of equity using the dividend growth model
- 4.1.3 Understand systematic risk, unsystematic risk and beta as a measure of relative risk
- 4.1.4 Understand the capital asset pricing model (CAPM), its assumptions, pros and cons
- 4.1.5 Be able to analyse the cost of equity using CAPM

1.1 The Dividend Growth Model

At its core, the Dividend Growth Model (DGM) proposes that the value of a company's stock is equivalent to the present value of all anticipated future dividends. In other words, it assumes that investors determine the worth of a stock by considering the dividends they expect to receive. The formula for calculating the cost of equity using this model is as follows:

$$\text{Cost of equity (K}_e\text{)} = D_1/P_0 + g$$

Let's break down the components:

- D_1 represents the projected dividend per share for the upcoming period.
- P_0 is the current stock price.
- g is the expected constant growth rate of dividends, and it's a pivotal factor in the equation.

1.1.1 Assumptions Underlying the Dividend Growth Model

- **Stable Dividend Growth** – the model relies on the assumption that dividends will grow at a constant rate (g) indefinitely. This constant growth rate assumption simplifies calculations but may not hold true for all companies, as dividend growth often fluctuates.
- **Single-Period Holding** – it assumes investors will hold the stock for just one period, usually a year, and then sell it. This doesn't account for longer holding periods or variations in investment horizons.
- **No Taxes or Transaction Costs** – the model does not consider taxes on dividends or the transaction costs associated with buying and selling stock.

1.1.2 Pros

- **Simplicity** – the Dividend Growth Model is relatively simple and accessible, making it a valuable tool for analysts and investors.
- **Useful for Dividend-Paying Stocks** – it's particularly valuable for assessing companies that consistently pay dividends.
- **Highlights Dividend-Value Relationship** – the model emphasises the link between dividend payments and a company's valuation, a concept that's intuitive for investors.

1.1.3 Cons

- **Assumption of Constant Growth** – the model's reliance on the constant growth rate assumption may not accurately represent the dynamics of many companies' dividend growth.
- **Ignores Share Repurchases** – it focuses solely on dividends and doesn't account for share repurchases (buybacks), which is a common method of returning value to shareholders.
- **Limited Applicability** – the model may not be suitable for companies that don't pay dividends or have irregular dividend patterns.
- **Sensitivity to Growth Rate** – the cost of equity estimate is highly sensitive to the chosen growth rate (g), and minor changes can lead to significant variations in the cost of equity.

Example

Let's work through a simplified numerical example to demonstrate how the DGM can be used to calculate the cost of equity for a fictional company, XYZ plc.

Assumptions

1. Current dividend (D_0): £2.00 per share
2. Expected dividend growth rate (g): 5%
3. Current share price (P_0): £40.00 per share

Step 1 – Calculate the next year's expected dividend (D_1): $D_1 = D_0 \times (1 + g)$ $D_1 = £2.00 \times (1 + 0.05)$ $D_1 = £2.00 \times 1.05$ $D_1 = £2.10$ per share

Step 2 – Use the dividend growth model formula: Now, we can use the I formula to calculate the cost of equity (K_e):

$$K_e = (D_1 / P_0) + g$$

$$K_e = (2.10 / 40.00) + 0.05 \quad K_e = 0.0525 + 0.05 \quad K_e = 0.1025 \text{ or } 10.25\%$$

So, in this example, the cost of equity for XYZ is approximately 10.25%.

1.2 Estimating Dividend Growth

There are three main methods of estimating the expected growth rate for a company's dividends that we will consider here:

- looking at comparable companies and published data
- extrapolating from past dividend growth
- looking at reinvestment levels.

1.2.1 Information from Comparable Companies and Published Data

One of the simplest approaches is to establish the growth rates of the company itself or other comparable companies with a listing by looking at published forecasts. This information will be available from brokers' circulars and other published information.

1.2.2 Extrapolation from Past Dividend Growth

An alternative approach is to look at the past dividend growth achieved by the company and assume that this will continue in the future. For example, Michael plc has paid the following dividends over recent years:

Michael plc – Dividends	
Year	£
2019	5,000
2020	5,900
2021	6,950
2022	7,300
2023	8,450

Over a four-year period, the dividend has grown from £5,000 to £8,450. Assuming a roughly constant growth rate, the increase in dividends could be shown as follows.

Michael plc Dividends with Constant Growth	
Year	£
2019	5,000
2020	$5,000 (1 + g)$
2021	$5,000 (1 + g)^2$
2022	$5,000 (1 + g)^3$
2023	$5,000 (1 + g)^4$

The value of g can be calculated from the equation:

$$5,000 (1+g)^4 = 8,450$$

$$(1+g)^4 = \frac{8,450}{5,000}$$

$$g = 0.14 \text{ or } 14\%$$

1.2.3 Looking at Reinvestment Levels – the ‘rb’ Model

Instead of looking at past dividend growth as a guide to the future, an alternative approach is to focus on what causes dividends to grow in the first place. Growth in dividends is caused by reinvestment in the business. If we can estimate what future levels of reinvestment are likely to be and what returns those investments are going to achieve, we can predict increases in the company's profitability and its dividend payouts.

Example

No Reinvestment

Consider a company that does not retain any of its earnings and pays everything out as a dividend. It earns a return of 20% on its existing investments and has existing net assets of £1,000. Earnings will therefore be £200 ($1,000 \times 20\%$). Over a number of years, its financial results will therefore look as follows:

Income Statement

	Year 1 £	Year 2 £	Year 3 £
Profit after tax	200	200	200
Dividends	200	200	200
Retained profit	–	–	–
Opening net assets	1,000	1,000	1,000
Closing net assets	1,000	1,000	1,000

Since the company is not retaining any of its profits, its asset base remains at £1,000. Since it is generating a return of 20% on net assets, its profits and dividends also remain at £200.

Example

Reinvestment – Retention of Profits

If the company were to retain a constant proportion of its earnings, say 60%, then initially dividends would fall. However, the company's net assets would increase, meaning that future profits and hence future dividends would rise. This can be seen as follows:

	Year 1 £	Year 2 £	Year 3 £
Profit after tax	200	224	251
Dividends	80	89	100
Retained profit	120	135	151
Opening net assets	1,000	1,120	1,255
Closing net assets	1,120	1,255	1,406

In this example, we have assumed that the retained profits earn the same return when reinvested as do the existing net assets. This means that the profit after tax each year can be calculated as opening net assets $\times$ 20% (eg, $\text{£}1,120 \times 20\% = \text{£}224$). Since the proportion of profits retained is constant and the returns earned on reinvestment are constant, the growth in profits is also constant, in this case 12% a year. The dividends will therefore also grow at a rate of 12% a year.

The growth rate in dividends can be calculated by using the following formula.

$$g = rb$$

Where:

r = the rate of return earned on new investments

b = proportion of profits retained each year

In the above example, $g = 0.2 \times 0.6 = 0.12$ or 12%

1.3 Systematic and Unsystematic Risk

Systematic risk, also known as market risk or undiversifiable risk, is the risk that is inherent in the entire market or a specific market segment. It cannot be eliminated through diversification because it affects all investments within that market. Systematic risk arises from macroeconomic factors and events that impact the overall market. Examples of systematic risk factors include economic recessions, interest rate changes, political instability, and natural disasters. Investors have little control over systematic risk, and it affects all investments in the market to some degree.

Unsystematic risk, also known as specific risk or diversifiable risk, is the risk that is unique to a particular company or asset. It can be reduced or eliminated through diversification by spreading investments across various assets or sectors. Unsystematic risk arises from factors that are specific to a company or

industry, such as management issues, supply chain disruptions, regulatory changes, or competition. By holding a diversified portfolio of assets, investors can mitigate or eliminate the impact of unsystematic risk on their overall portfolio.

Investors demand a return commensurate with the risk they face. Since our investor faces only the systematic risk of each investment in their portfolio, the returns they demand will be based on this. This means that the premium for risk will be a function of systematic risk only, not the total risk of the investments concerned.

1.3.1 Measuring Relative Risk – Beta

Beta quantifies the sensitivity of an asset's returns to movements in the overall market. In other words, it measures how much an asset's returns tend to rise or fall in response to changes in the market's returns. Beta is used to understand an asset's risk and its potential for delivering returns relative to the market.

A beta of 1 indicates that the asset's returns move perfectly in sync with the market. If the market goes up by 1%, the asset is expected to go up by 1%, and if the market goes down by 1%, the asset is expected to go down by 1%.

A beta greater than 1 suggests the asset is more volatile than the market. For example, a beta of 1.5 indicates that the asset's returns tend to move 1.5 times as much, in either direction, as the market's returns. It's considered more risk-sensitive.

A beta less than 1 implies the asset is less volatile than the market. A beta of 0.8 indicates that the asset's returns typically move only 80% as much as the market's returns. It's considered less risk-sensitive.

A negative beta suggests that the asset's returns move in the opposite direction of the market's returns. In other words, when the market rises, the asset tends to fall, and vice versa.

Beta helps investors gauge the relative riskiness of an asset. High-beta assets are riskier but may offer higher potential returns, while low-beta assets are less risky but might offer more modest returns. Investors also use beta to build diversified portfolios that match their risk tolerance. A portfolio with a mix of assets with different betas can balance risk and return. Another use of beta is seen in performance evaluation where portfolio managers and analysts use beta to assess the historical performance of investments in relation to market movements. Beta also plays a crucial role in asset pricing models like the Capital Asset Pricing Model (CAPM), where it is used to estimate an asset's expected return (or cost of capital) based on its risk relative to the market.

Although beta has many uses as seen above, it does suffer some limitations. Firstly, beta is not static and can vary over different time periods. Short-term fluctuations can impact beta values. Secondly, beta assumes a linear relationship between the asset and the market, which may not always hold true, especially during extreme market conditions. And finally, beta primarily measures systematic risk (market risk) and may not capture all the factors affecting an asset's returns, particularly unsystematic or company-specific risk.

1.4 The Capital Asset Pricing Model (CAPM)

The Capital Asset Pricing Model (CAPM) is used to determine the expected return on an investment based on its risk in relation to the overall market. It can also be used as an alternative to the dividend growth model (DGM) for working out the cost of equity. Unlike the DGM that is based on historical dividends, CAPM provides valuable insights into returns investors require and how assets should be priced in a well-functioning financial market.

1.4.1 Components of CAPM

- **Expected Return (R)** – the expected return on an investment, typically denoted as 'R', represents the anticipated profit or loss that an investor expects to earn from holding a specific asset or portfolio.
- **Risk-Free Rate (R_f)** – this is the theoretical return an investor can earn from an absolutely risk-free investment, such as a UK **gilt**. It serves as the baseline return an investor would require for taking on any risk.
- **Market Return (R_m)** – the market return represents the overall return earned from investing in the entire market, often approximated by an index like the FTSE 100 or S&P 500.
- **Beta (β)** – Beta is a measure of an asset's or a portfolio's systematic risk, which reflects how sensitive its returns are to market movements. As seen above, it quantifies the asset's risk relative to the market. A beta of 1 indicates that the asset's returns move in line with the market, while a beta greater than 1 signifies higher volatility, and a beta less than 1 suggests lower volatility.
- **Market Risk Premium (R_m – R_f)** – the market **risk premium** represents the excess return investors expect to earn by taking on the risk of investing in the market rather than a risk-free asset. It quantifies the additional return needed to compensate for market risk.

1.4.2 The CAPM Formula

$$K_e = R_f + \beta(R_m - R_f)$$

Where:

K_e – cost of equity or expected return

R_f – risk-free rate

β – Beta, which measures the asset's systematic risk

R_m – market return

(R_m – R_f) – market risk premium.

Exercise 4.1

The information that follows applies to a company in the pharmaceutical industry. The risk-free rate is 2%, the market return is 10% and the company's shares have a beta (β) of 1.5. Calculate the cost of equity for the company.

Solution

To calculate the cost of equity (K_e) using CAPM, we can use the following formula:

$$K_e = R_f + \beta(R_m - R_f)$$

$$K_e = 0.02 + 1.5(0.10 - 0.02)$$

$$K_e = 0.14 \text{ or } 14\%$$

Exercise 4.2

Company ABC is a publicly traded company in the technology sector. The risk-free rate is currently 3% and the market risk premium is 7%. The shares have a beta (β) of 1.2. Calculate the cost of equity for the company.

Solution

To calculate the cost of equity (K_e) using CAPM, we can use the following formula:

$$K_e = R_f + \beta(R_m - R_f)$$

Note that the market risk premium of 7% ($R_m - R_f$) has already been provided.

$$K_e = 0.03 + 1.2(0.07)$$

$$K_e = 0.114 \text{ or } 11.4\%$$

1.4.3 Assumptions of CAPM

CAPM makes the assumption of perfect capital markets. In a perfect capital market, there are no frictions or imperfections that hinder the flow of information, trading or investment decisions. These include:

- **Transaction costs** – this means there are no fees or costs associated with buying or selling assets. Investors can trade without incurring expenses.
- **Taxes** – the assumption of no taxes means that investors do not have to pay taxes on their investment gains or dividends. In reality, tax implications can significantly impact investment decisions.
- **Borrowing or lending restrictions** – investors can borrow and lend unlimited amounts of money at the risk-free rate. There are no limits or constraints on these activities.

These assumptions simplify the model but may not accurately reflect the real-world complexities of financial markets, where transaction costs, taxes, and borrowing constraints do exist.

Another assumption of CAPM is that investors are rational decision-makers who carefully consider all available information before making investment choices. Rational investors aim to maximise their utility, which is typically measured in terms of expected returns and risk. They strive to achieve the best risk-return trade-off. However, in reality, investor behaviour often deviates from perfect rationality due to emotions, cognitive biases and limited information.

A further assumption is the existence of a single risk-free rate. CAPM assumes that there is only one risk-free rate in the market. This rate represents the return an investor can earn with absolute certainty, typically associated with government bonds. In the real world, various risk-free rates may exist, such as different maturities of government bonds. The yield on these bonds may vary, introducing complexity to the model.

Homogeneous expectations is another assumption of the CAPM model. Homogeneous expectations mean that all investors in the market share the same views and forecasts regarding future returns, volatilities and **correlations** of assets. In practice, investors have diverse opinions and expectations about the future, leading to varying investment decisions.

One final assumption is that all investors have identical investment horizons, meaning they plan to hold their investments for the same period. In reality, investors have different time horizons, goals and financial needs. Some may have a short-term focus, while others have a long-term perspective.

These assumptions are made to simplify the CAPM model and make it more manageable mathematically. However, they represent an idealised version of financial markets and investor behaviour. Many real-world investment models and strategies account for these complexities to provide a more realistic assessment of risk and return.

2. Debt

Learning Objective

- 4.2.1 Be able to calculate the cost of irredeemable and redeemable bonds
- 4.2.2 Be able to calculate the impact of taxation on the cost of debt

2.1 Irredeemable Fixed Rate Debt

A company's cost of debt can be estimated in very much the same way as with equity, using the DGM. With irredeemable debt that pays a constant amount of interest, we have an analogous situation to a constant dividend so the formula will exclude any growth. Since interest payments are tax deductible, there will be a before and after-tax cost of irredeemable bonds.

$$K_{id(\text{before tax})} = \frac{\text{Coupon}}{\text{Market price}}$$

$$K_{id(\text{After tax})} = K_{id(\text{Before tax})} (1 - t), \text{ where 't' is the tax rate}$$

Or

$$K_{id(\text{After tax})} = \frac{\text{Coupon}}{\text{Market price}} (1 - t), \text{ where 't' is the tax rate}$$

Example

A company has issued £1,000,000 in irredeemable bonds with a fixed annual coupon rate of 6%. The current market price of the bonds is £950,000. The corporate tax rate for is 30%. Calculate the after-tax cost of debt for the company.

Solution

First, let's calculate the before-tax cost of debt:

$$K_{id(\text{Before tax})} = \text{Coupon} / \text{Market price}$$

$$K_{id(\text{Before tax})} = 0.06 \times 1,000,000 / \text{Market price } 950,000 = 0.0632 \text{ or } 6.32\%$$

Now, let's calculate the after-tax cost of debt ($K_{id(\text{After tax})}$) using the corporate tax rate ($t = 0.30$):

$$K_{id(\text{After tax})} = K_{id(\text{Before tax})} (1 - t), \text{ where 't' is the tax rate}$$

$$K_{id(\text{After tax})} = 6.32\% (1 - 0.3) = 4.42\%$$

So, the after-tax cost of debt for the company is approximately 4.42%.

2.2 Redeemable Fixed Rate Debt

For a redeemable fixed rate bond, the cost of debt is calculated by finding an internal rate of return (IRR). The current market value of the bond, coupon payments and the redemption value will be required. Since interest on debt is tax deductible, this will need to be taken into account when calculating cost of debt.

Illustration

Andolini plc has redeemable debt in issue with a market value of £850,000 and a nominal value of £1,000,000. It is paying a coupon of 10% and is redeemable in three years' time at par. The corporation tax rate is 30%. Tax relief is received in the same year as the interest payments are made.

The required return of the investor is the IRR of the following cash flows. Recall that the IRR represents the interest rate that equates the present value of the future cash flows of the bond to the current price. The table below illustrates that this rate is 16.76%.

Time	Narrative	Flow £000	Present Value at 16.76%
0	Market value	(850)	(850)
1	Interest	100	86
2	Interest	100	73
3	Interest and redemption	1,100	691
Net present value			–
Internal rate of return (ie, return of debt investors)			16.76%

The after tax cost of debt for the company can now be estimated as $16.76\% \times 0.7 = 11.73\%$.

In the above illustration, the IRR of 16.76% has been provided. In practice this is something that will need to be calculated or estimated. Details on how to calculate an IRR by linear interpolation are provided in chapter 5.

2.3 Floating Rate Debt

The return to investors for floating rate debt on its reset date will be the new coupon. The cost of debt to the company will be based on the coupon less related tax relief. Assuming instantaneous tax relief, this will be given by the simplistic formula we have seen above.

$$k_d = r_d(1-t)$$

2.4 Impact of Taxation

As can be seen from the calculations above, when adjustments are made for tax, the cost of debt decreases, ie, the after-tax cost of debt is lower than the before-tax cost of debt. This is because of the fact that interest on debt is a tax deductible expense, ie, interest payments are deducted before a company pays tax.

Illustration

Fredo plc has in issue some irredeemable debt paying a coupon of 10%. It is quoted at a price of £95 per cent. This means that every £100 nominal value of the stock has a market value of £95 and pays annual interest of £10. The investors' required rate of return or the cost of debt for the company is:

$$K_{id} \text{ (Before tax)} = \text{Coupon/Market price} = 10/95 = 0.105 \text{ or } 10.5\%.$$

If there were no corporation tax, the cost of debt for Fredo plc would be given by the investors' required rate of return, 10.5%. In order to be able to pay the investors a return of 10.5% on their investment of £95, Fredo plc would need to generate cash of £10. However, the payment of interest will in fact reduce the company's corporation tax charge, since interest is an allowable expense for tax purposes. This will reduce the net post-tax cost to the company of paying the interest. In the case of Fredo plc, if we assume that corporation tax is charged at a rate of 25%:

Interest paid to investors	10
Less: reduction in tax charge	(2.5)
Net post-tax cost to Fredo plc	7.5

This means that in order to pay the debt investors their required return of 10.5% (10/95), the company only needs to generate post-tax returns of 7.5/95, ie, 7.9%. The cost of debt to the company is therefore lower than the required return of the debt investors.

3. Weighted Average Cost of Capital (WACC)

Learning Objective

- 4.3.1 Be able to analyse an entity's weighted average cost of capital (WACC)
- 4.3.2 Know the difference between book value and market value weightings when calculating WACC

The weighted average cost of capital (WACC) is a critical financial metric used to determine the average cost of financing a company's operations. It represents the weighted average of the cost of equity, cost of debt, and potentially other sources of financing, taking into account their respective proportions in the capital structure.

The WACC is calculated using the cost of capital of each source of capital for the company. The weights used are typically based on market values. **Book values** can be obtained from the company's financial statements and are therefore relatively easy to obtain. Book values, however, are based on historical cost and as such can severely underestimate the cost of equity thus understating the WACC. The consequence of an artificially low WACC is that investment projects which are not financially viable

will seem to be acceptable. Market value weights use the market values of equity and debt, which are determined by the current market prices of the company's shares and bonds. Market value weights are generally preferred over book value weights when calculating WACC because they capture the current market conditions and investor perceptions. However, obtaining accurate market values for debt can be challenging, especially for private companies with limited publicly traded bonds.

3.1 Calculating WACC

The formula for calculating WACC is as follows:

$$\text{WACC} = (K_e \times \frac{MV_e}{MV_e + MV_d}) + (K_d(1-t) \times \frac{MV_d}{MV_e + MV_d})$$

Where:

K_e = cost of equity

K_d = cost of debt after tax

MV_d = value of debt

MV_e = value of equity

t = tax rate

Exercise 4.3

A publicly traded company has the following financial information:

- Market value of equity: £25,000,000
- Market value of debt: £10,000,000
- Cost of equity (K_e): 12%
- Cost of debt (K_d): 5%
- Tax rate (t): 25%

Calculate the company's WACC.

Solution

First find the after-tax cost of debt:

$$K_d(1-t) = 5\% (1 - 0.25) = 3.75\%$$

Then use the formula for WACC:

$$WACC = (K_e \times \frac{MV_e}{MV_e + MV_d}) + K_{d(1-t)} \times \frac{MV_d}{MV_e + MV_d}$$

$$WACC = (12\% \times \frac{25}{25 + 10}) + 3.75 \times \frac{10}{25 + 10}$$

$$WACC = 8.57\% + 1.07\% = 9.64\%$$

4. Effects of Gearing

Learning Objective

4.4.1 Be able to analyse how gearing affects the cost of equity, debt and overall WACC

Higher debt levels increase the variability of returns to equity. This can be seen from comparing the returns of two companies with different levels of gearing in two different economic scenarios.

	Company U		Company G	
	Scenario 1	Scenario 2	Scenario 1	Scenario 2
	£	£	£	£
Profits before interest	1,000	500	1,000	500
Interest	–	–	(400)	(400)
Profits after interest	1,000	500	600	100

It can be seen that, whereas returns to equity fall by 50% (500/1,000) for the ungeared company, they fall by over 80% (500/600) for the geared company. As a result of the increased risk, equity investors in

the geared company will require a higher rate of return. This increase in required returns for equity will tend to increase a company's WACC as it gears up.

From the above, we see that increased gearing affects the WACC in two conflicting ways. It tends to be reduced due to the lower cost of debt finance but pulled up by the increasing cost of equity. The question is, which force is the stronger one?

4.1 Effect of Gearing on the Cost of Equity

For an ungeared company, the WACC will be the same as the cost of equity, since such a company only has the one source of finance. At low levels of gearing, the company's cost of equity remains fairly constant. Equity investors are not concerned with low levels of gearing and believe that it does not significantly affect the risk of their investment. Therefore, they do not require any significant extra return to compensate them for the additional gearing risk.

As debt levels increase, however, shareholders will become more concerned about the increased gearing risk attached to their investment. At some stage, this concern will translate into higher required rates of return to compensate equity investors for the additional risk.

When a particular threshold of gearing is exceeded, shareholders demand higher rates of return. This means that, while at low levels of gearing the cost of equity is relatively constant, at higher levels it increases sharply.

4.2 Effect of Gearing on the Cost of Debt

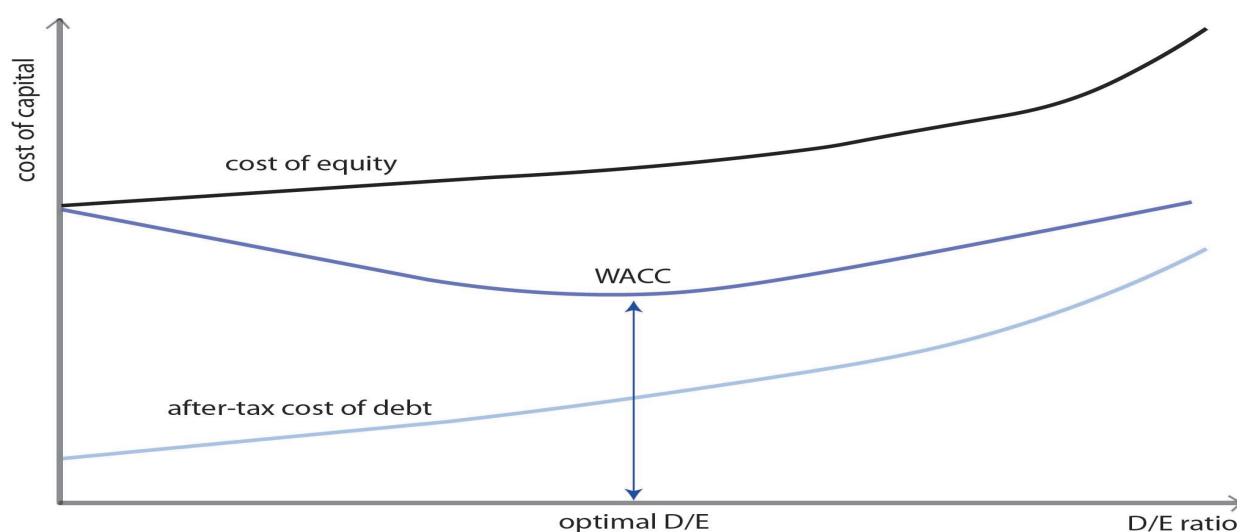
The cost of debt remains constant at low to medium levels of gearing. However, at higher levels it increases to compensate debt investors for increased default risk.

4.3 Overall Impact of Gearing on WACC

At lower levels of gearing, equity finance is being replaced by cheaper debt finance. However, the cost of the remaining equity does not increase significantly for the reasons noted above. This means that the WACC of the company will fall.

At higher levels of gearing, the introduction of cheap debt still has a downward pull on the company's WACC. However, there is now also a significant upward pull due to increases in the cost of equity. The net effect of these two conflicting forces is that the WACC starts to rise. At very high levels of gearing, increases in the cost of debt mean that the WACC increases even more dramatically.

These ideas can be summarised on a graph.



4.4 Implications for Capital Structure

The implication of the above for a company is that it will have an optimal level of gearing that will minimise its WACC. A low WACC will be beneficial since it will enable the company to accept more projects with positive **net present values (NPVs)**.

Companies should always raise finance to enable them to move towards their optimal gearing level and their minimum WACC. A company on the far left of the graph should raise debt finance for new projects, while in contrast a company that has gone too far to the right should raise equity finance to reduce gearing levels.

Once the company has hit its optimal capital structure, it should aim to stay there and always raise finance in such a way as to achieve this. Since it would be impractical to constantly raise a mixture of debt and equity for each new project, the company should first issue debt and then issue equity, meaning that it oscillates around its optimal point rather than remaining precisely on it.

5. Project Specific Discount Rates or Risk Adjusted Cost of Capital

Learning Objective

4.4.2 Be able to analyse project-specific discount rates with specific focus on equity and asset betas

The WACC can be used as the cost of capital when appraising new investment projects. Note that investment appraisal is covered in detail in chapter 5.

An adjustment will need to be made to the WACC if the risk profile of the new investment is significantly different from the business risk of the company. CAPM allows for a project specific risk adjusted cost of capital.

5.1 Betas Re-visited

The betas referred to in CAPM are known as equity betas (which are also known as dividend or geared betas); an equity beta reflects a company's business risk and financial risk. When the financial risk is stripped away only business risk remains – this is known as an ungeared beta, earnings beta, or asset beta.

5.2 Calculating a Project Specific Risk Adjusted WACC using CAPM

Step 1

Find a proxy company whose business risk is similar to that of the proposed investment and obtain the equity beta (representing both business and financial risk).

Step 2

Find the asset beta by ungearing the equity beta to remove the financial risk.

$$\beta_a = \beta_e \times \left[\frac{E}{E+D(1-t)} \right]$$

Where E represents the percentage of the company's finance represented by equity and D represents the percentage of the company's finance represented by debt.

Step 3

Adjust/regear the asset beta obtained in step 2 to reflect the financial risk of the investing company.

$$\beta_e = \beta_a \times \left[\frac{E+D(1-t)}{E} \right]$$

This process produces an equity beta that can be placed in the CAPM formula in order to calculate a required rate of return (a cost of equity). This can be used as the project-specific discount rate for the proposed investment if it is financed entirely by equity. If debt finance forms part of the financing for the proposed investment, a project-specific weighted average cost of capital can be calculated.

Example

Rivco Energy is a company involved in producing high quality household lighting products and is considering diversifying into the furniture business. The new venture has an expected return of 15%. The company will use the CAPM to establish an appropriate discount rate to apply to the new venture and has the following information about suitable proxy companies.

A plc

This company has an equity beta of 1.23 and is wholly involved in furniture making. It is financed by 35% debt and 65% equity.

B plc

This company has an equity beta of 1.27 and is also wholly involved in furniture making. It is financed by 40% debt and 60% equity.

C plc

This company has an equity beta of 1.46 and is financed by 30% debt and 70% equity. It is split into two divisions of equal size: one division produces furniture and the other produces wallpaper. The wallpaper division is seen as 50% more risky than the furniture division.

Other information

1. Rivco Energy has traditionally adopted a financing mix of 33% debt and 67% equity. If the project is accepted, it would be financed entirely by equity.
2. The current yield on Treasury bills stands at 4% and the return on the stock market is 10%.
3. The corporation tax rate is 30% for all companies.
4. Corporation debt can be assumed to be risk free.

Calculate the project specific discount rate to be applied to the project.

Solution

Step 1 – Find the asset beta by un-gearing each proxy's equity beta. Since three proxies have been identified, an average of the resulting asset betas will need to be calculated.

A plc

$$\beta_a = 1.23 \times \frac{65}{65 + 35 (1-0.3)} = 0.893$$

B plc

$$\beta_a = 1.27 \times \frac{60}{60 + 40 (1-0.3)} = 0.866$$

C plc

C plc is involved in furniture and wallpaper production thus the equity beta relevant to furniture production must be isolated before the asset beta could be calculated.

Both divisions are of equal size therefore:

$$1.46 = (0.5 \times \beta_e \text{ furniture}) + (0.5 \times \beta_e \text{ wallpaper})$$

Since the wallpaper division is 50% more risky than the furniture division, the following relationship applies:

$$1.46 = (0.5 \times (\beta_e \text{ furniture})) + (0.5 \times 1.5 \times \beta_e \text{ furniture})$$

$$\beta_e \text{ furniture} = 1.168$$

$$\beta_a = 1.168 \times \frac{70}{70+30 (1-0.3)} = 0.898$$

$$\text{Average } \beta_a = (0.893 + 0.866 + 0.898) / 3 = 0.886$$

Step 2 – Re-gear the average asset beta using Rivco Energy's debt to equity ratio to find the appropriate equity beta.

$$\beta_e = 0.886 \times \frac{67 + 33 (1-0.3)}{67} = 1.16$$

Step 3 – Calculate the cost of equity using CAPM

$$K_e = 4\% + 1.16 \times (10\% - 4\%) = 10.96\% = 11\%$$

Exercise 4.4

Hubba plc, an all-equity financed food manufacturer, is about to embark on a major diversification into the consumer electronics industry. Its current equity beta is 1.2, while the average equity beta of electronics firms is 1.6. Gearing in the electronics industry averages 30% debt, 70% equity by market values. Debt is considered risk free.

The market return is 25%, the risk-free rate is 10% and the tax rate is 30%.

Estimate a suitable discount rate for the project if it were financed:

- i. entirely by equity
- ii. by 30% debt, 70% equity (by market values)
- iii. by 40% debt, 60% equity (by market values).

Solution**i. 100% equity financing**

The starting point is to find the systematic risk of the electronics industry – measured by the asset beta (β_a)

$$\beta_a = 1.6 \times \frac{70}{70 + 30(1 - 0.3)} = 1.23$$

$$k_e = 10\% + 1.23(25\% - 10\%)$$

$$k_e = 28.45\%$$

ii. 30% debt, 70% equity

Project gearing = industry gearing, so use $\beta_e = 1.6$ to get k_e

$$k_e = 10\% + 1.6(25\% - 10\%)$$

$$k_e = 34\%$$

$$k_d = 10\%(1 - 0.3)$$

$$WACC = (34\% \times 0.7) + (7\% \times 0.3)$$

iii. **40% debt, 60% equity**

$\beta_a = 1.23$. Adjust to reflect new

$$\beta_e = 1.23 \frac{60 + 40(1-0.3)}{60} = 1.804$$

$$k_e = 10\% + 1.804(25\% - 10\%)$$

$$k_e = 37.06\%$$

$$k_d = 7\%$$

$$WACC = (37.06\%) + (7\% \times 0.4)$$

$$WACC = 25.036\%$$

6. Modigliani and Miller

Learning Objective

- 4.4.3 Know Modigliani and Miller's theory on capital structure and the assumptions behind the theory both with and without taxation

In order to understand the impact that capital structure has on beta, we consider theories on capital structure. Modigliani and Miller developed theories on gearing based on a series of highly restrictive assumptions as follows:

1. **Investors Make Rational Decisions** – Modigliani and Miller assume that investors are rational and hence their actions are logical and can be predicted.
2. **There are No Dealing Costs When Buying and Selling Securities** – the absence of dealing costs when buying and selling securities enables investors to buy and sell securities on the basis of their value rather than being deterred by transaction costs. It enables arbitrage to take place so that all companies should be valued fairly.
3. **All Investors Have Costless Access to All Relevant Information** – this again enables companies to be valued fairly by the marketplace.
4. **Companies and Individuals Can All Borrow and Lend at One Rate of Interest** – this means that there is no advantage to corporate gearing as opposed to personal gearing so that there is no incentive for an investor to buy shares in a geared company. The lack of a borrowing and depositing spread means that the actions of individuals are not constrained by the transaction cost this implies. Arbitrage can therefore take place to ensure all companies are valued fairly.

5. **Debt is Risk Free** – this is a simplification that can be relaxed. Its advantage is that it means that a company can never become insolvent, which simplifies any analysis.
6. **There is No Taxation** – this simplification can also be relaxed, but it is convenient to consider initially the situation where no tax exists before adding in tax refinements.

6.1 The Basic Theory

6.1.1 Two Equivalent Companies

Modigliani and Miller considered two equivalent companies, ie, companies that are precisely the same in all respects, except for the fact that one is ungeared (Company U) and one is geared (Company G). The financial results for these two companies are as follows.

	Company U £	Company G £
Earnings	1,000	1,000
Interest	–	(400)
Dividends	1,000	600

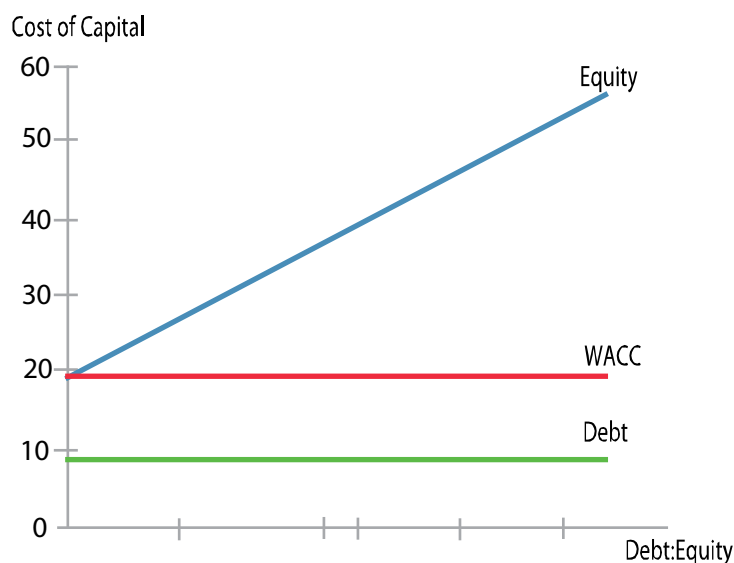
Both companies pay out all their earnings each year, either as interest to debt investors or dividends to equity investors.

Modigliani and Miller pointed out that the total payouts of both companies are the same at £1,000. Whether these payouts are called dividends or interest is irrelevant. Since both companies generate the same cash flows for their investors, they must have the same total market value. The combined value of Company G's equity and its debt must be equal to the value of Company U's equity.

Any single investor would be indifferent between the choice of owning all of Company U's equity and receiving £1,000, all of which is called a dividend, and owning all of Company G's debt plus equity and receiving £1,000, part of which is called interest and part of which is called dividends. Splitting the ownership between a number of people should still not affect the total market value. The total cake remains the same, however, it is shared out among different investors.

Since the total market values (debt plus equity) of both companies are the same and the total payouts (dividends plus interest) are the same, the WACC for both companies must be the same.

These ideas can be expressed on a graph.



Since debt is assumed to be risk free, it has the same cost regardless of the level of gearing. The WACC likewise remains constant whatever the level of gearing, as we have seen above. Given these two lines and the way in which gearing has been defined as $MV_{\text{debt}}/MV_{\text{equity}}$, it can be shown that the cost of equity will rise in a straight line as indicated.

The benefits of cheap debt finance are counterbalanced exactly by the increased returns required by equity investors, meaning that the company's WACC remains constant.

6.1.2 Implications for Capital Structure

Since a company's market value and its WACC remain constant, regardless of how it has financed itself, the financing decision is irrelevant. All that matters is that any project has a positive net present value when discounted at the company's existing WACC (assuming the project is in the same business risk class as the remainder of the company's investments).

6.1.3 Formulae

Modigliani and Miller used their rigorous academic approach to develop formulae that will exactly predict the change in the cost of a company's equity and the market value of its equity at different gearing levels. These formulae are as follows:

1.

$$MV_u = MV_{eg} + MV_d$$

Where:

MV_u = market value of the ungeared company's equity

MV_{eg} = market value of the geared company's equity

MV_d = market value of the geared company's debt

2.

$$WACC_u = WACC_g$$

Where:

$WACC_u$ = WACC of the ungeared company (which will also be its cost of equity)

$WACC_g$ = WACC of the geared company

3.

$$k_{eg} = k_u + (k_u - r_f) \times \frac{MV_d}{MV_{eg}}$$

Where:

k_u = cost of equity of the ungeared company (which will also be its WACC)

k_{eg} = cost of equity of the geared company

r_f = cost of debt for the geared company, which is the risk-free rate of interest

Exercise 4.5

Luigi plc is an ungeared company with a market value of £10m. It pays all of its earnings out as a constant annual dividend of £2m and has a cost of equity of 20%.

It decides to reorganise its capital structure and raises £1m of irredeemable debt at a cost of 5%. It uses the £1m to repay part of its equity.

- What is the new market value of the equity?
- What is the new cost of equity?
- What is the new WACC?

Solution

- Assuming that Modigliani and Miller's theory applies, the market value of the company must remain the same as before, ie, at £10m. Since the debt has a market value of £1m, the equity must have a market value of £9m.
- The new cost of equity can be calculated as the new dividend divided by the new market value of the equity. The new dividend will be the total earnings of the company of £2m less the interest payment of £50,000 (£1m x 5%), ie, £1.95m. The cost of equity is therefore 21.67%.
- The new WACC is as follows:

$$WACC = (K_e \times \frac{E}{E+D}) + (K_{d(1-t)} \times \frac{D}{E+D})$$

$$WACC = (21.67 \times \frac{9}{9+1}) + (5 \times \frac{1}{9+1}) = 20\%$$

Checking the Equations

It can be seen that the WACC has remained unchanged at 20%. The formula for the cost of equity can also be checked:

$$k_{eg} = k_u + (k_u - r_f) \times \frac{MV_d}{MV_{eg}}$$

$$21.67 = 20 + (20 - 5) \times \frac{1}{9}$$

The above illustration does not prove that Modigliani and Miller's theories are correct, of course. It merely shows that, given Modigliani and Miller's assumptions and accepting that the total market value of the company cannot change, the equations produced by Modigliani and Miller will hold good.

6.2 Introducing Corporation Tax

Having established that, in the limited circumstances above, a company's capital structure is irrelevant, Modigliani and Miller considered one of the major limitations in their analysis, the existence of corporation tax. They continued to assume, however, that there was no personal tax.

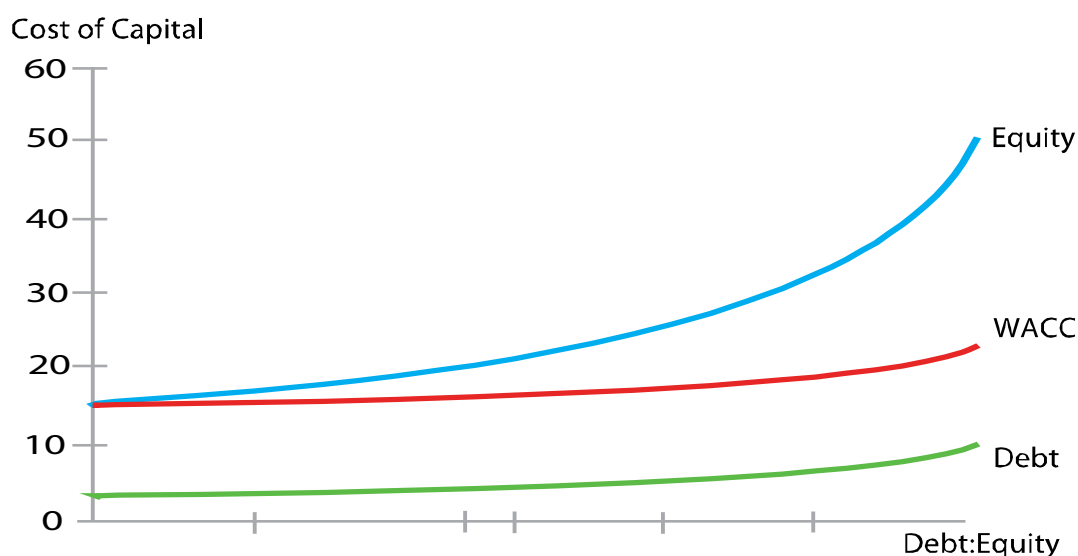
In the UK, when a company pays interest to debt investors, it is eligible for tax relief, whereas dividend payments to equity investors do not qualify as an allowable expense for the company. The implication of this different tax treatment for the two equivalent companies above can be seen by comparing their earnings streams. Assume corporation tax at 31%.

	Company U £	Company G £
Earnings	1,000	1,000
Interest	–	(400)
Profit before tax	1,000	600
Corporation tax	(310)	(186)
Profit after tax = dividends	690	414
Total payouts to investors		
– Interest	–	400
– Dividends	690	414
	690	814

In this case, the geared company can afford to pay out more in total to debt and equity investors than the ungeared company. The difference of £124 is due to the tax relief on the interest of £400 x 31%.

The fact that payouts in total from the geared company exceed payouts in total from the ungeared company means that a rational investor would pay more to acquire the debt and equity together of Company G than the equity of Company U. The total market value of G's debt plus equity exceeds the market value of U's equity.

The effect of this on a company's WACC as it increases its level of gearing can be seen from the following graph.



As the company borrows more money and substitutes debt for equity funding, the cost of equity rises to reflect the increased gearing risk. However, due to the tax relief on interest payments, the cost of debt to the company is now cheaper than before. This means that the benefit of cheap debt more than compensates for the increase in the cost of equity. The net effect is that the WACC falls in a curved line, constantly decreasing as the level of debt increases, but never quite falling to the level of the cost of debt.

6.3 Adapting the Formulae for Corporation Tax

The formulae introduced above can be adapted slightly to take account of corporation tax. All the symbols used are as above, with the additional symbol, CT, being used for corporation tax.

$$MV_g = MV_u + MV_d \times CT$$

MV_g = the total value of the geared company, ie, $MV_{eg} + MV_d$

This formula confirms what was stated earlier, that the total market value of the geared company exceeds that of the ungeared company. The exact amount by which its market value is higher is given by $MV_d \times CT$.

$$WACC_g = WACC_u \left[1 - CT \times \frac{MV_d}{MV_g} \right]$$

This formula confirms that the WACC of the geared company is lower than that of the ungeared company. The higher the level of corporation tax, or the higher the level of gearing, the lower the WACC becomes:

$$k_{eg} = k_u + (k_u - r_f) \frac{MV_d}{MV_{eg}} \times (1-CT)$$

This confirms that the cost of equity in the geared company is higher than that in the ungeared company, due to gearing risk.

Note that in all three equations, if corporation tax is nil, then they become the same as the equations introduced earlier in the absence of corporation tax.

Exercise 4.6

Sonny plc is an ungeared company with a market value of £10m. It has constant profits before tax of £4m and suffers corporation tax at a rate of 40%. All post-tax profits are paid out as a dividend. Its dividend is therefore £2.4m and it has a cost of equity of 24% (2.4/10).

Sonny decides to issue £2m of irredeemable debt at the risk-free rate of interest of 5%. It uses the proceeds to repay equity finance.

- What is the new market value of Sonny's equity?
- What is the new cost of equity?
- What is the new WACC?

Solution

(a) New market value of equity

With corporation tax, Modigliani and Miller implies that the value of the geared firm is:

$$MV_g = MV_u + (MV_d \times CT)$$

Here, $MV_u = £10m$, $MV_d = £2m$, and $CT = 40\%$.

$$\text{Value of tax shield} = MV_d \times CT$$

$$= 2.0 \times 0.40$$

$$= £0.8m$$

Therefore:

$$MV_g = 10.0 + 0.8 = £10.8m$$

Equity value is total value less debt:

$$MV_e = MV_g - MV_d$$

$$= 10.8 - 2.0$$

$$= \mathbf{£8.8m}$$

(b) New cost of equity

First calculate the revised dividend (all post-tax profit is paid out).

Annual interest on debt:

$$\text{Interest} = 5\% \times £2\text{m} = £0.1\text{m}$$

Revised profit after tax:

	£
Profit before interest and tax (EBIT)	4,000,000
Less interest	(100,000)
Profit before tax	3,900,000
Corporation tax at 40%	(1,560,000)
Profit after tax = dividend	2,340,000

New cost of equity:

$$K_e = \text{Dividend} / \text{Market value of equity}$$

$$= 2.34 / 8.8$$

$$= 0.2659$$

$$= \mathbf{26.59\%}$$

(c) New WACC

After-tax cost of debt:

$$K_d(1 - CT) = 5\% \times (1 - 0.40) = 3\%$$

Market value weights:

$$V = E + D = 8.8 + 2.0 = 10.8$$

$$E/V = 8.8/10.8 = 0.8148$$

$$D/V = 2.0/10.8 = 0.1852$$

$$\text{WACC} = (E/V \times K_e) + (D/V \times K_d(1 - CT))$$

$$= (0.8148 \times 26.59\%) + (0.1852 \times 3\%)$$

$$= 21.67\% + 0.56\%$$

$$= 22.23\% \text{ (approx.)}$$

This confirms that WACC has fallen from 24% (ungeared) to approximately 22.23% once the tax shield is introduced.

Checking the equations

Predicted cost of equity (with corporation tax):

$$K_e = K_u + (K_u - K_d) \times (D/E) \times (1 - CT)$$

Here, K_u is the ungeared cost of equity, which is 24% (ungeared firm).

$$D/E = 2.0 / 8.8 = 0.2273.$$

$$K_e = 24\% + (24\% - 5\%) \times 0.2273 \times 0.60$$

$$= 24\% + 19\% \times 0.1364$$

$$= 24\% + 2.59\%$$

$$= 26.59\%$$

This matches the cost of equity calculated from the new dividend and equity value.

Notes:

- The value uplift comes from the tax shield: $MV_d \times CT$.
- The cost of equity rises because gearing increases equity risk.
- The WACC falls because interest is tax deductible.

7. Taxes and Capital Structure Decisions

Learning Objective

4.4.4 Be able to analyse the effect of taxes on capital structure decisions

Taxes can have a significant effect on a company's capital structure, influencing decisions related to debt and equity financing. The tax deductibility of interest makes debt financing more attractive because it lowers the after-tax cost of debt. As a result, companies may be incentivised to use debt as a source of financing, which can lead to a higher debt-to-equity ratio in the capital structure.

The interest expense deduction creates a tax shield that reduces a company's tax liability. The annual value of this tax shield is equal to the interest expense multiplied by the corporate tax rate. The tax shield provides a financial benefit to the company and effectively reduces the cost of debt. This can make debt financing more cost-effective compared to equity financing, influencing the company to use more debt in its capital structure.

The interplay between debt and equity financing, influenced by taxes, leads to the concept of an optimal capital structure. Companies aim to strike a balance between debt and equity to minimise their overall cost of capital and maximise shareholder value. The optimal capital structure is the mix of debt and equity that results in the lowest WACC. Taxes play a crucial role in determining the optimal capital structure. Companies need to consider their tax rate, as well as the risk associated with different levels of debt, to find the right balance. The optimal capital structure may vary from one company to another based on their unique financial circumstances.

In summary, taxes can significantly influence a company's capital structure by affecting the attractiveness of debt financing, the cost of capital, and the overall financial strategy. Companies must carefully assess their tax position, tax deductibility of interest, and the optimal balance between debt and equity to make informed decisions regarding their capital structure.

End of Chapter Questions

Think of an answer for each question and refer to the appropriate section for confirmation.

1. According to the Dividend Growth Model (DGM), how is the value of a company's stock calculated, and what are the key components involved in the formula for determining the cost of equity using this model?

Answer reference: Section 1.1

2. What are the three key assumptions underlying the Dividend Growth Model (DGM), and how might these assumptions limit its applicability in real-world investment scenarios?

Answer reference: Section 1.1.1

3. What are the main advantages or pros associated with the Dividend Growth Model (DGM), and how do these advantages make it a useful tool for investors and analysts?

Answer reference: Section 1.1.2

4. What are the main methods used for estimating dividend growth for the Dividend Growth Model (DGM)?

Answer reference: Section 1.2

5. Explain the concept of beta and its significance in assessing an asset's risk and potential returns in relation to the market.

Answer reference: Section 1.3.1

6. Describe how different values of beta indicate an asset's volatility compared to the market.

Answer reference: Section 1.3.1

7. What are the limitations associated with using beta as a measure of risk and performance evaluation?

Answer reference: Section 1.3.1

8. How is the cost of irredeemable fixed rate debt calculated?

Answer reference: Section 2.1

9. How is the cost of redeemable fixed rate debt calculated?

Answer reference: Section 2.2

10. How is the cost of debt affected by the tax deductibility of interest?

Answer reference: Section 2.1, 2.2 and 2.4

11. Explain how the return to investors for floating rate debt is determined on its reset date.

Answer reference: Section 2.3

12. Explain the concept of Weighted Average Cost of Capital (WACC) and its significance in determining a company's average cost of financing.

Answer reference: Section 3

13. Why are market value weights generally preferred when calculating WACC, and what challenges might companies face in obtaining accurate market values for debt, particularly for private companies?

Answer reference: Section 3

14. What happens to the cost of equity as debt levels increase, and why does it increase sharply beyond a certain threshold of gearing?

Answer reference: Section 4.1

15. Describe the relationship between gearing levels and the cost of debt.

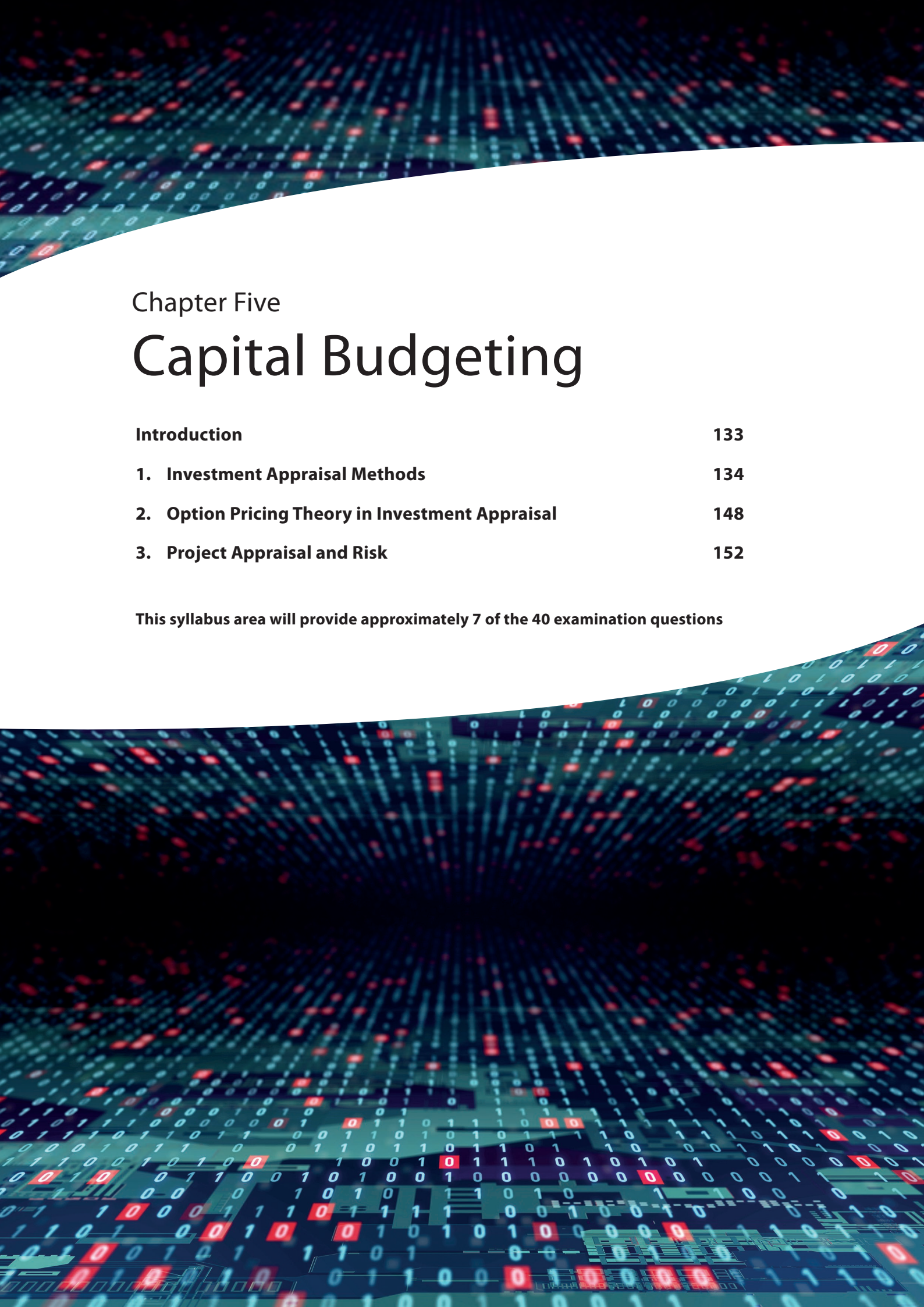
Answer reference: Section 4.2

16. Describe the strategic approach that companies should take regarding their capital structure, including the considerations for raising debt and equity, and how they should maintain their optimal capital structure over time.

Answer reference: Section 4.4

17. What are the steps involved in calculating a project specific risk adjusted WACC using CAPM?

Answer reference: Section 5.2



Chapter Five

Capital Budgeting

Introduction	133
1. Investment Appraisal Methods	134
2. Option Pricing Theory in Investment Appraisal	148
3. Project Appraisal and Risk	152

This syllabus area will provide approximately 7 of the 40 examination questions



Introduction

Capital budgeting, also known as investment appraisal, is the process by which organisations evaluate and select long-term investment projects and expenditures. These projects typically involve substantial financial commitments and have a significant impact on the company's financial performance and strategic goals.

Capital budgeting helps organisations identify potential investment opportunities that align with their strategic objectives. These opportunities can include investments in new product development, expansion of facilities, acquisition of assets, research and development projects, and more.

It involves evaluating and analysing investment proposals to determine their feasibility, profitability and potential risks. This assessment considers both quantitative factors (such as cash flows and return on investment) and qualitative factors (such as strategic alignment, market conditions, regulatory compliance).

Capital budgeting aids in allocating limited financial resources among competing projects. Organisations need to prioritise and select projects that offer the highest potential return on investment while considering budget constraints.

Part of the process involves assessing the inherent risks associated with each investment project. Understanding the risks allows organisations to implement risk mitigation strategies and make informed decisions.

Finally, capital budgeting helps in aligning investment decisions with the company's strategic goals. It ensures that selected projects contribute to the organisation's long-term growth and profitability.

In this Chapter we begin by looking at investment appraisal methods such as **return on capital employed (ROCE)**, net present value (NPV), internal rate of return (IRR), modified internal rate of return (MIRR) and adjusted present value (APV). In addition to understanding the application of each method, we will consider the relative pros and cons of the various methods.

The chapter then focuses on real options in project appraisal such as the option to delay, expand or withdraw. In this context, the Black-Scholes Option Pricing Model is explored as a means of valuing real options.

The chapter ends with a discussion on project appraisal and risk. Specifically, the use of sensitivity analysis and Monte Carlo simulation in evaluating investment projects are explored before an overview of how environmental, social and governance (ESG) issues can affect capital investment decisions.

1. Investment Appraisal Methods

Learning Objectives

- 5.1.1 Be able to analyse the payback and discounted payback period of an investment
- 5.1.2 Be able to analyse the return on capital employed (ROCE) of an investment
- 5.1.3 Be able to analyse the net present value (NPV) of an investment
- 5.1.4 Be able to analyse the internal rate of return (IRR) and modified internal rate of return (MIRR) of an investment
- 5.1.5 Understand the usefulness of adjusted present value (APV) as an investment appraisal method
- 5.1.6 Know the relative pros and cons of the various investment appraisal methods

1.1 Payback and Discounted Payback Period

This is a measure of how long it will take for the cash inflows of a project to be equal to the initial investment. In other words how long a project will take to pay back the money spent on it. If there is a constant cash flow the payback period would be:

$$\frac{\text{Initial payment}}{\text{Annual cash flow}}$$

Note: If cash flows vary each year, a cumulative approach must be used.

Advantages

- The payback period is relatively straightforward and easy to understand. It provides a quick assessment of how long it will take to recover the initial investment.
- It utilises cash flows and not profits (which can be manipulated).

- The method favours projects with the shortest payback periods hence allows the company to recover cash quickly and thus take advantage of other investment opportunities.
- Choosing projects with the shortest payback positively affects liquidity.

Disadvantages

- The payback period does not consider the time value of money, meaning it does not account for the fact that money has a different value at different points in time.
- It does not take into account the cash flows that occur after the payback period, neglecting the overall financial viability of the investment.
- Difficult to choose if projects have the same payback.
- The minimum payback period of the company which acts as a benchmark for choosing projects is set at the discretion of management.
- Does not give a view of how projects will affect shareholder wealth and company value.

The discounted payback period is a variation of the traditional payback period that takes into account the time value of money. Unlike the regular payback period, which only considers the unadjusted cash flows, the discounted payback period factors in the present value of cash flows.

1.1.1 Payback Period Calculation

Moto Ltd is planning on purchasing new machinery costing £4,000. Over the next seven years the cash inflows will be £500, £1000, £600, £700, £1,800, £1,000, £1,100. The payback period is calculated using cumulative cash flows as below:

Year	Annual cash flow (£)	Cumulative cash flow (£)
0	(4,000)	(4,000)
1	500	(3,500)
2	1,000	(2,500)
3	600	(1,900)
4	700	(1,200)
5	1800	600

Payback calculation

At the end of Year 4, £1,200 of the initial investment remains unrecovered.

Year 5 cash inflow = £1,800.

Fraction of Year 5 required to recover the balance:

$$\text{Fraction of year} = 1,200 / 1,800 = 0.67$$

Payback period

Payback period = 4 + 0.67 = 4.67 years (approximately) or 4 years and 8 months.

If the discounted payback was required, the cash flows would need to be discounted at an appropriate discount rate (usually the company's cost of capital) before calculating cumulative cash flows. In this example, if we assume a discount rate of 10%, over the next seven years the discounted cash inflows will be £454, £826, £497, £572, £1,318, £554, £530. The discounted payback using cumulative cash flows will be as follows:

Year	Discounted CF	Cumulative
0	(4,000)	(4,000)
1	455	(3,545)
2	826	(2,719)
3	451	(2,268)
4	478	(1,790)
5	1,118	(672)
6	564	(108)

Discounted payback occurs between Years 6 and 7.

Remaining after Year 6: £108

Year 7 discounted inflow: £564

Fraction:

$$108 / 564 = 0.19$$

Discounted payback ≈

$$6 + 0.19 = 6.19 \text{ years}$$

≈ 6 years and 2 months

1.2 Return on Capital Employed

ROCE, or Return on Capital Employed, is an investment appraisal technique used by businesses to assess the efficiency and profitability of their capital investments. It measures how effectively a company utilises its capital to generate profits as an investment appraisal technique and is also known as 'return on investment' (ROI) and 'accounting rate of return' (ARR).

1.2.1 Calculation

For a project with an expected life of several years, ROCE would be calculated based on the estimates of the returns over that time as follows.

$$\text{ROCE} = \frac{\text{Average annual profit before interest payable and tax}}{\text{Capital employed}} \times 100\%$$

Exercise 5.1

It is estimated that a company will receive income net of direct costs of £100,000 pa over the three-year life of a project, Project A. An alternative three-year project, Project B, will generate £324,000 at the end of the third year.

The initial capital required for either project is £240,000, which will be used to acquire a machine that will be fully depreciated and scrapped at the end of this time.

Which project, if either, should be undertaken, on the basis that the alternative use for this cash is to place it on deposit for three years earning compound interest at 10% pa?

Solution

Project A

Over Three Years	£
Total net income (before depreciation)	300,000
Total depreciation	(240,000)
Total profit before interest payable	60,000
Average annual profit	£20,000

$$\text{ROCE} = £20,000 / £240,000 = 8.33\%$$

Project B

Over Three Years	£
Total net income (before depreciation)	324,000
Total depreciation	(240,000)
Total profit before interest payable	84,000
Average annual profit	£28,000

$$\text{ROCE} = £28,000 / £240,000 = 11.67\%$$

On the basis of ROCE, Project B appears better than Project A under this criterion, but should it be undertaken?

Having calculated the ROCE for our projects, we need a required rate for comparison purposes in order to make our decision. This could be the bank account return of 10% compound interest, which gives the following:

Year £	Balance B/F £	Interest for Year £	Balance C/F £
1	240,000	24,000	264,000
2	264,000	26,400	290,400
3	290,400	29,040	319,440
		79,440	
Average annual profit		26,480	

ROCE = £26,480 / £240,000 = 11.03% pa

As we can see, Project B generates a higher return than this, hence in the absence of any other information, Project B is acceptable.

1.2.2 Advantages and Disadvantages of ROCE

Advantages:

- ROCE provides a clear and straightforward measure of how well a company generates returns from its capital investments. It is a useful tool for assessing the financial performance of individual projects or the overall company.
- ROCE allows for easy comparison of the performance of different projects, business units or companies within the same industry. It helps identify which investments are more efficient at generating returns.
- ROCE emphasises capital efficiency, encouraging companies to use their capital wisely. It helps management identify areas where capital allocation can be improved.
- By factoring in the cost of capital, ROCE implicitly considers the risk associated with an investment. A higher ROCE indicates that the investment is generating returns that exceed its cost of capital, implying a favourable risk-adjusted return.
- ROCE assesses the sustainability of returns over the long term. It ensures that investments not only generate profits but also provide returns that justify the capital employed over the life of the project.

Disadvantages:

- ROCE is based on historical financial data, which may not fully reflect future market conditions or changes in the investment landscape. It is backward-looking and may not capture forward-looking risks and opportunities.
- ROCE provides a broad measure of performance but may not provide detailed insights into the specific factors driving investment success or failure. It does not consider the timing of cash flows and the time value of money.

- ROCE relies on accounting metrics such as **operating profit** and capital employed, which can be subject to manipulation or distortions due to accounting practices. It may not accurately reflect economic reality.
- ROCE focuses solely on financial returns and does not consider non-financial factors such as environmental, social, or governance (ESG) impacts. In today's business environment, these factors can significantly affect investment outcomes.
- Different companies or analysts may calculate ROCE differently, leading to inconsistencies in comparisons. For example, variations in how capital employed is defined can affect ROCE results.
- ROCE may not be suitable for evaluating certain types of investments, such as start-ups or projects with significant **intangible** assets. It may undervalue investments with long gestation periods or those with higher upfront costs.

1.3 Net Present Value (NPV)

The net present value (NPV) of a capital investment project represents present value of the cash outflows incurred and cash inflows generated by a project. NPV is widely used as an investment appraisal technique to assess the financial viability of an investment by comparing the present value of expected cash flows to the initial investment cost. The steps involved are as follows:

1. **Identify cash flows** – to use NPV, you start by identifying the expected cash flows associated with the investment. These cash flows typically include initial costs, operating revenues, expenses, and terminal (end-of-project) values.
2. **Discount cash flows** – each of the cash flows is then discounted to their present values using a discount rate. The discount rate represents the required rate of return or cost of capital, considering the time value of money.
3. **Calculate NPV** – NPV is calculated by subtracting the initial investment cost from the sum of the present values of expected cash flows.
4. **Interpret NPV** – a positive NPV indicates that, on a present value basis, the investment is expected to generate more cash flows than the initial cost, suggesting that it may be a profitable venture. A negative NPV suggests that the investment may not be financially viable.
5. **Decision rule** – in decision-making, a common rule is to accept projects or investments with a positive NPV and reject those with a negative NPV. If comparing multiple projects, you would choose the one with the highest NPV.

Exercise 5.2

Trolcon is currently considering investing in new research equipment costing £65,000. The equipment is expected to generate the following cash flows:

Year	£000
1	15
2	18
3	30
4	15
5	8

The research equipment can be sold for £4,000 after its useful economic life of 5 years. Calculate the NPV of the new research equipment at the company's cost of capital of 15%.

Solution

PV of cashflows:

Years	Cashflow (£)	15%	PV (£)
1	15,000	$1/1.15$	13,050
2	18,000	$1/1.15^2$	13,608
3	30,000	$1/1.15^3$	19,740
4	15,000	$1/1.15^4$	8,580
5	12,000	$1/1.15^5$	5,964
			60,942

NPV = PV of cash flows – initial investment = £60,942 – £65,000 = -£4,058

Since the NPV is negative, the investment is not financially viable.

1.3.1 Advantages and Disadvantages of NPV

Advantages:

- Considers the time value of money. NPV recognises the time value of money through discounting. It recognises that money today is worth more than the same amount in the future, providing a more accurate representation of the investment's true viability.
- NPV considers all relevant cash flows, including initial investments, operating cash flows and terminal values, providing a comprehensive view of the project's financial impact.
- NPV offers an objective criterion for investment decisions. If the NPV is positive, the investment adds value to the firm.
- NPV can handle a wide range of investment types, from simple projects to complex capital investments or mergers and acquisitions.
- NPV analysis can incorporate sensitivity analysis to assess the impact of changing variables, such as cash flow projections or discount rates, on the investment's viability.

Disadvantages:

- NPV calculations can be complex, especially for projects with irregular cash flows or long durations. This complexity can lead to errors in analysis.
- The selection of an appropriate discount rate is subjective and can significantly impact NPV results. Different analysts may use different rates.
- NPV relies on estimates of future cash flows, which can be subject to error or bias. Small changes in these estimates can lead to significant NPV variations.

1.4 Internal Rate of Return (IRR)

The internal rate of return (IRR) of any investment is the discount rate at which the net present value (NPV) of the cash flows is equal to zero. A project will only be selected if its internal rate of return exceeds the cost of capital or target rate of return. The IRR is used to calculate the discount rate at which NPV is equal to zero.

If calculating IRR manually, ie, without the use of a spreadsheet or financial calculator, we can use the interpolation method. That is, we evaluate the NPV at two different costs of capital and then, by assuming a straight-line relationship between NPV and cost of capital, estimate where the NPV becomes zero. The formula for this is:

$$\text{IRR} = a\% + \left(\frac{A}{A - B} \right) \times (b - a) \%$$

Where:

- | | | |
|---|---|--------------------------------------|
| a | = | is lower of two rates of return used |
| b | = | is higher of two rates used |
| A | = | is NPV obtained using rate a |
| B | = | is NPV obtained using rate b |

Exercise 5.3

You are evaluating an investment project with the following Net Present Values (NPVs) at different discount rates:

- At a 10% discount rate, the NPV is \$5,000.
- At a 15% discount rate, the NPV is -\$2,000.

Calculate the approximate Internal Rate of Return (IRR) for this investment using interpolation.

Solution

$$\text{IRR} = 10\% + \frac{5,000}{5,000 + 2,000} \times 5\% = 13.57\%$$

Interpolation, as can be seen in the exercise above, involves finding a result for IRR between the two cost of capital figures that we have chosen, ie, selecting 'a' and 'b' such that the IRR falls in between. The IRR can also be estimated using extrapolation: estimating a figure outside of that range, ie, selecting values for 'a' and 'b' such that the IRR does not fall in between. Interpolation will usually give the more accurate solution; hence we should always try to achieve this if possible.

1.4.1 The Multiple IRR Problem

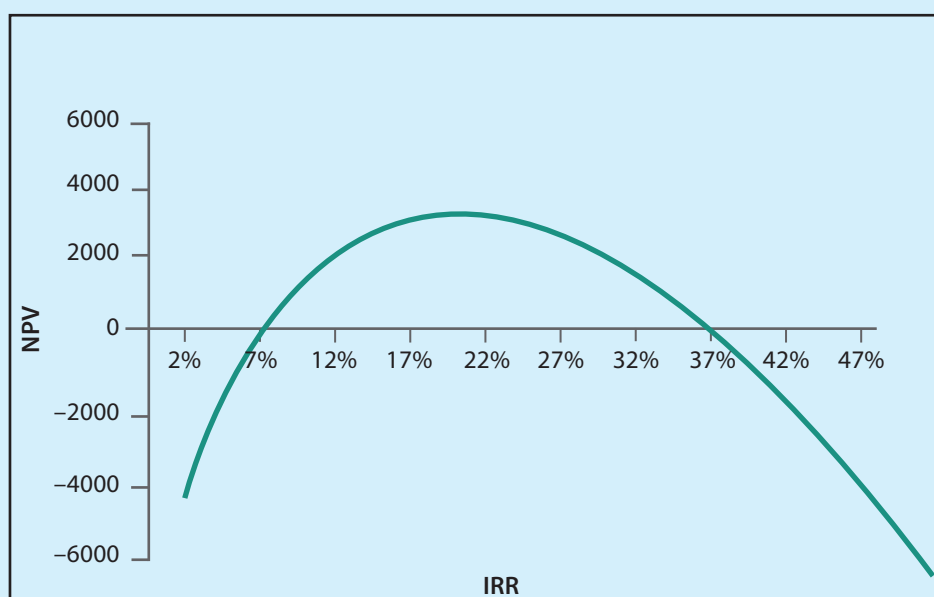
The IRR and the NPV methods of investment appraisal produce the same result only when the project has 'normal' or 'conventional' cash flows, ie, a negative initial cash flow followed by a series of positive cash flows. If the cash flows change signs, then the IRR may not be unique: ie, there may be more than one value for IRR. This is referred to as the multiple IRR problem.

Example

Consider the following example, where the cash flow for the second year is negative. The cash flows have been discounted using a rate of 10% and the resulting NPV is positive. This project, however, suffers from the multiple IRR problem: ie, the NPV is equated to zero for the project and is discounted at 5.1% and 39.8%.

Time	Cash Flow £	Discount Factor £	Present Value £
0	-245,000	1	-245,000
1	600,000	0.909	545,455
2	-360,000	0.826	-297,521
			2,934

If we plot the NPV for this project at various discount rates, we find the following:



The NPV is initially negative, increases and becomes positive, reaches a maximum value and then declines and becomes negative again. According to the decision rule, we should accept projects for which $IRR > \text{discount rate}$. However, in this case, because the IRR takes on two values, and based on the NPV profile shown in the diagram, the investment will be feasible (ie, it will have a positive NPV) if the cost of capital or discount rate lies between the two IRR values of 5.1% and 39.8%.

1.4.2 Comparison of NPV and IRR

The rule for making investments under the NPV method is that where investments are mutually exclusive, the one with the higher NPV should be preferred. Where investments are independent, all investments should be accepted if they have positive NPVs. The reason for this is that they are generating sufficient cash flows to give an acceptable return to providers of debt and equity finance. This is known as the NPV rule.

The IRR rule states that, where an investment has cash outflows followed by cash inflows, it should be accepted if its IRR exceeds the cost of capital. This is because such investments will have positive NPVs.

1.4.2 Limitations of IRR

Where we are dealing with independent investments, the IRR should usually come to the same decision as the NPV approach. However, it cannot be used to distinguish between mutually exclusive investments. This is because it merely indicates whether or not a project has a positive NPV. It does not tell us the magnitude of the NPV. Hence, it cannot be used to decide which is the superior project.

Mutually Exclusive Projects

We have two projects that both require an initial investment of £10,000. Project A has an IRR of 25% per annum, project B has an IRR of 20% pa. Which project should we select?

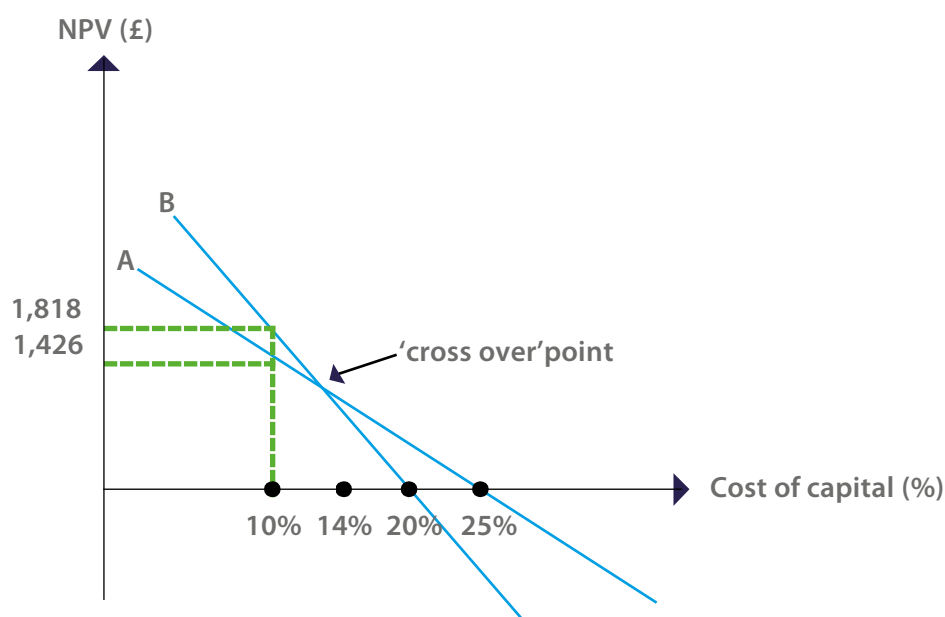
The answer may appear fairly clear cut, ie, that we select the project with the higher IRR. However, we are also told that the company's cost of capital is 10% and are provided with the following data.

Time	Project A	Project B
0	(10,000)	(10,000)
1	12,000	1,000
2	625	13,200

Now that the cost of capital is known, it would be incorrect to decide between these alternatives based on IRRs. Calculating each project's NPV would be required as shown below:

	Project A	Project B
NPV@10%	1,426	1,818
IRR	25%	20%

What we can see is that project A has the higher IRR of 25%, but it has a lower NPV at the company's cost of capital. This means that at a 10% cost of capital, project B is preferable, even though it has the lower IRR. However, when the cost of capital is 20%, project A would be preferred since project B would then have a NPV of zero while project A must still have a positive NPV. It can be seen that the decision depends not on the IRR but on the cost of capital being used.



As can be seen from the graph above, the NPV profiles cross over at a discount rate of approximately 14%. There are two reasons why this may occur, the differences in:

- timing of the cash flows for each project, and
- the project sizes (or project scales).

In our example, there is no difference in project size, with both projects having an initial investment of £10,000. However, there are differences in the timing of the cash flows, with project B having high cash flows in Year 2 and project A having high cash flows in Year 1.

Look again at the graph above. You should see that the NPV profile for project B shows a far steeper line. This is because it has higher cash inflows in the more distant year. Therefore, it is much more affected by an increasing discount rate. In contrast, project A has higher value cash flows in the earlier year. This means that it is less affected by the increase in discount rate.

Conflicting Rankings Using the NPV and IRR Methods

Note that, in our example, where the discount rate is greater than 15% (the changeover or crossover rate), selecting an investment based on either the higher NPV or the higher IRR will give the same answer. In this case, for discount rates between 15% and 20%, project A has the higher NPV while it also has the higher IRR.

In our example, for discount rates of less than 15%, selecting an investment based on the higher IRR gives an answer which conflicts with the NPV method, since it will select project A, although project B has the higher NPV.

Re-investment Rate

The problem with selecting investments based on the higher IRR is that it makes an assumption that cash flows can be reinvested at the IRR over the life of the project. In contrast, the NPV method assumes that cash flows can be reinvested at the cost of capital over the life of the project. In reality, neither may be true.

1.5 Modified Internal Rate of Return (MIRR)

The Modified Internal Rate of Return (MIRR) is a refinement of the traditional Internal Rate of Return (IRR) method. It was developed to address two recognised weaknesses of IRR.

First, the IRR method implicitly assumes that all interim positive cash flows generated by a project are reinvested at the IRR itself. Where the IRR is high, this assumption may be unrealistic, as the firm may not be able to reinvest at that rate. Secondly, in projects with non-conventional cash flows, where the sign of cash flows changes more than once, the IRR method may produce multiple rates of return or no meaningful solution.

MIRR overcomes these problems by imposing a consistent and realistic reinvestment assumption and by ensuring that only one rate of return is generated.

1.5.1 Definition of MIRR

MIRR is defined as the rate of return that equates the present value of a project's cash outflows with the future, or terminal, value of its cash inflows, where those inflows have been compounded at the company's required rate of return.

Under this approach, the financing and reinvestment components of the project are separated. All negative cash flows are discounted to the present at the required rate of return, typically the firm's weighted average cost of capital. All positive cash flows are compounded forward to the end of the project at that same rate. The MIRR is then the single rate that links these two values over the life of the project.

Formally, MIRR satisfies:

$$PV_{\text{outflows}} \times (1 + \text{MIRR})^n = FV_{\text{inflows}}$$

where n represents the project life in years. Rearranging gives:

$$\text{MIRR} = \left(\frac{FV_{\text{inflows}}}{PV_{\text{outflows}}} \right)^{1/n} - 1$$

In the common case where there is a single initial investment at time zero, the present value of outflows is simply the initial outlay.

1.5.2 Calculation of MIRR: Worked Example

Consider a project requiring an initial investment of £10,000 and generating cash inflows of £4,000 in each of Years 1, 2 and 3. Assume that the company's required rate of return is 10 per cent.

The first step is to determine the present value of the outflows. Since there is a single outflow at time zero, the present value of outflows is £10,000.

The second step is to calculate the terminal value of the inflows by compounding each positive cash flow forward to the end of Year 3 at 10 per cent. The Year 1 inflow of £4,000 is compounded for two years to £4,840. The Year 2 inflow is compounded for one year to £4,400. The Year 3 inflow remains £4,000. The total terminal value of inflows is therefore £13,240.

The third step is to calculate the rate that equates the initial investment with this terminal value:

$$\text{MIRR} = \left(\frac{13,240}{10,000} \right)^{1/3} - 1$$

This gives approximately 9.8 per cent. This result is consistent with the project having a net present value close to zero at a 10 per cent discount rate.

1.5.3 Relationship with IRR and NPV

The difference between IRR and MIRR lies in the treatment of reinvestment. IRR assumes reinvestment at the internal rate itself, whereas MIRR assumes reinvestment at the cost of capital. When the IRR significantly exceeds the cost of capital, MIRR will typically produce a lower rate of return because it reflects more realistic reinvestment opportunities.

In many cases where there is a conflict between IRR and NPV rankings, MIRR produces results that are consistent with NPV. However, MIRR remains a rate-based measure and does not directly quantify the increase in shareholder wealth. The Net Present Value method remains the theoretically preferred decision rule because it measures the absolute increase in value. MIRR should therefore be regarded as an improved rate-of-return measure rather than a replacement for NPV.

1.6 Adjusted Present Value (APV)

Adjusted Present Value (APV) is a financial valuation method used to assess the value of a business, project or investment by considering both the present value of its cash flows and the impact of financing decisions. APV is particularly useful when evaluating projects or businesses with complex capital structures, varying levels of debt, or when there are significant tax shields involved.

The adjusted present value approach is to establish the total value of the project and compare that to the value of the finance raised. If the value of the project exceeds the finance raised for the project, it has a positive net present value and should be accepted.

1.6.1 APV steps:

1. **Ungeared Cash Flows (CF_U):**
 - The first step in calculating APV is to determine the present value of the project's cash flows without considering any financing.
 - These cash flows, known as ungeared cash flows, represent the cash generated by the project before taking into account the impact of debt or other financing sources.
2. **Tax Shields (T):**
 - Tax shields represent the tax benefits associated with interest expenses on debt. Interest payments on debt are tax-deductible, which reduces a company's taxable income and, consequently, its tax liability.
 - To calculate tax shields, multiply the interest expense by the corporate tax rate (usually the marginal tax rate). The result is the tax savings or shield.
3. **Subsidies or Other Financing Effects (S):**
 - In some cases, there may be subsidies or other financing effects that impact the project's cash flows. These can include government grants, incentives or other financial assistance.
 - Such subsidies are added to the CF_U to reflect their positive impact on cash flows.
4. **Present Value of Financial Distress Costs (PVFDC):**
 - Financial distress costs refer to the costs a company may incur if it encounters financial difficulties, such as bankruptcy or default on debt.
 - The present value of these costs, if applicable, is subtracted from the CF_U to account for the potential negative impact on cash flows due to financial distress.
5. **Present Value of Terminal Value (TV):**

- The terminal value represents the value of the project or business at the end of the projection period. It is typically estimated using methods like the perpetuity growth model or the exit multiple method.
- The terminal value is added to the CF_U to capture the value beyond the projection period.

Calculation:

The APV calculation involves combining these components:

$$APV = CF_U + T + S - PVFDC + TV$$

1.6.2 Advantages

- APV can handle complex financing structures and capture the impact of various financing decisions on the project's value.
- It breaks down the components affecting the project's value, making it easier to identify the key value drivers.
- Sensitivity analyses can be performed on specific components, such as tax shields or terminal value, to assess their impact on overall project valuation.

1.6.3 Disadvantages

- APV requires detailed financial modelling and can be more complex than other valuation methods, such as the **Discounted Cash Flow (DCF)** method.
- It relies on various assumptions, such as the estimation of financial distress costs and subsidies, which can introduce subjectivity.
- Accurate data on tax rates, interest expenses and other components are essential for APV calculations. Accurate data is not always available.

2. Option Pricing Theory in Investment Appraisal

Learning Objectives

- 5.2.1 Be able to analyse the following drivers of option value: value of the underlying; exercise price; time to expiry; volatility; the risk-free rate
- 5.2.2 Understand real options in investment appraisal: options to delay, expand or withdraw
- 5.2.3 Know the underlying assumptions and limitations of the Black-Scholes Option Pricing (BSOP) model in valuing real options

Investment projects often come with embedded real options, such as the option to delay, expand or withdraw based on future events or market conditions. Option pricing theory can help in valuing these real options within an investment project. Real options analysis extends traditional investment appraisal methods like NPV by considering the value of flexibility and adaptability.

Note that options are covered in detail in chapter 7. The basic terminology for understanding real options is provided below:

Option	The right but not the obligation to buy or sell a particular good at a specific price at or before a specific date.
Call option	The right to buy
Put option	The right to sell
European option	Can be exercised at expiration
American option	Can be exercised at any point up to and including expiration

2.1 Real Options

In the context of investment appraisal, real options represent the strategic opportunities or flexibilities that a firm has in managing its investments and projects over time. Real options are analogous to financial options (eg, call and put options) but apply to tangible assets and business decisions. Three common types of real options – expand, withdraw or delay – allow firms to adapt to changing market conditions and uncertainties.

2.1.1 Option to Expand

The option to expand, also known as the growth option, represents the opportunity to invest additional capital in a project or business if certain favourable conditions or opportunities arise. Imagine a manufacturing company that has built a new production facility. It may have the option to expand the facility's capacity in the future if market demand for its products increases. This allows the company to scale up production when necessary.

The option to expand is primarily akin to a call option because it gives the firm the right (but not the obligation) to invest additional capital in a project if certain favourable conditions materialise. It resembles a call option to buy more of the underlying asset.

When evaluating an investment with an option to expand, the firm considers the initial cost of the project and the potential future investment required for expansion. The value of the real option to expand increases as the likelihood of needing to expand, and the expected benefits of expansion, rise.

2.1.2 Option to Withdraw

The option to withdraw, also known as the abandonment option, represents the ability to discontinue an investment or project if it becomes unprofitable or if market conditions deteriorate. Suppose a technology company is developing a new software product. If the project encounters unexpected challenges or if the market for the software weakens, the company may decide to abandon the project rather than continuing to invest resources.

The option to withdraw is similar to a put option because it provides the firm with the right (but not the obligation) to discontinue an investment or project if it becomes unprofitable or if market conditions deteriorate. It closely resembles a put option to sell the underlying asset.

When evaluating an investment with an option to withdraw, the firm considers the initial investment cost and the potential future costs of shutting down the project. The value of the option increases as the level of uncertainty, and potential losses, rises.

2.1.3 Option to Delay

The option to delay, also known as the timing option, allows a firm to postpone an investment decision until more information becomes available. It offers the flexibility to wait for better market conditions or reduced uncertainty. For example, a renewable energy company may have the option to delay the construction of a wind farm until the regulatory environment becomes more favourable or the cost of wind turbines decreases. This allows the company to make a more informed decision about the timing of construction.

The option to delay can be seen as a call option because it provides the firm with the right (but not the obligation) to make an investment at a later date when conditions are more favourable. In this sense, it resembles a call option to buy the underlying asset at a predetermined strike price.

When evaluating an investment with an option to delay, the firm assesses the initial investment cost, the potential benefits of waiting and the costs associated with delayed implementation. In essence, the value of the option to delay is influenced by factors such as how uncertain the market environment is and the likelihood of conditions becoming more favourable if the investment is delayed. As these factors become more significant, the value of the delay option becomes more valuable as well.

2.2 Determinants of Option Value

The value of an option, whether it's a financial option or a real option in the context of investment appraisal, is influenced by several key determinants. These determinants help assess the option's worth and guide decision-making. Here are the primary determinants of option value:

- **Underlying Asset Price** – the current market price of the underlying asset is a crucial determinant. For a financial option, it's the price of the stock, commodity, or other asset. In investment appraisal, the underlying asset could be a project, investment, or asset with uncertain future returns. As the underlying asset's value changes, the option's value typically changes in the same direction.
- **Exercise Price** – the exercise price, also known as the strike price, is the price at which the option holder has the right to buy (in the case of a call option) or sell (in the case of a put option) the underlying asset. A lower exercise price for a call option or a higher exercise price for a put option increases option value.
- **Time to Expiration** – the amount of time remaining until the option's expiration is a critical determinant. Generally, the longer the time to expiration, the higher the option value. This is because a longer time period allows for more opportunities for the option to become profitable.

- **Volatility** – volatility refers to the degree of price fluctuation or uncertainty in the underlying asset's value. Higher volatility increases the value of both call and put options because it raises the likelihood of large price movements, which can benefit option holders.
- **Risk-Free Interest Rate (rf)** – the risk-free interest rate, often represented by the symbol r_f , represents the return that could be earned on a risk-free investment, such as a government bond. A higher risk-free interest rate tends to increase the value of a call option but decrease the value of a put option.

2.3 The Black-Scholes Option Pricing Model

The most important valuation model for options is the Black-Scholes model. It is commonly used in financial markets but the calculation can be applied to valuing real options as well.

2.3.1 Assumptions of the Black-Scholes Model

The Black-Scholes model makes a number of assumptions which are discussed below.

- **Lognormality** – the model assumes that the return on the underlying asset follows a normal distribution which means the return itself follows a lognormal distribution.
- **Perfect markets** – this suggests that the direction of the market cannot be consistently predicted and thus the returns on the underlying asset can go up or down at any given moment in time.
- **Constant interest rates** – the risk-free rate is used in the Black-Scholes model and this rate is assumed to be constant and known.
- **Constant volatility** – the model assumes that the volatility of the project is known and remains constant throughout its life.
- **Tradability of asset** – the model assumes that there is a market for the underlying asset and it can therefore be traded.

The two latter assumptions do not necessarily apply to real options. While volatility can be relatively constant in the very short term, it is never constant in the long term. It is not always the case that the underlying asset can be traded therefore this assumption limits the usefulness of the model for valuing real options, for example in situations involving less liquid listed companies.

2.3.2 Limitations of the Black-Scholes Model for Pricing Real Options

The Black-Scholes Option Pricing Model, while widely used for valuing financial options, has limitations when applied to real options, which involve strategic decisions in the context of investments and projects. Some of the key limitations of the Black-Scholes Model for valuing real options include:

- **Deterministic assumptions** – the Black-Scholes Model assumes that key parameters, such as volatility and interest rates, are constant and deterministic over time. In reality, these parameters can fluctuate significantly in response to changing market conditions and events, making it challenging to apply the model accurately to real options.
- **Single underlying asset** – the model is designed for single, tradable assets like shares. Real options often involve complex, multi-faceted investments and projects with multiple sources of uncertainty, which the Black-Scholes Model may not adequately capture.

- **Continuous trading** – the model assumes continuous trading, which is not applicable to real options where investment decisions are typically made discretely at specific points in time.
- **Risk-free rate** – the model relies on a risk-free interest rate for discounting future cash flows. In real options, the appropriate discount rate may vary depending on the specific circumstances and risks associated with the investment.
- **Inflexibility** – real options encompass a wide range of strategic choices, including options to expand, delay, or abandon projects. The Black-Scholes Model is not designed to handle these types of complex, multi-stage decisions.
- **American vs. European options** – the Black-Scholes Model is designed for European options, which can only be exercised at expiration. Real options often represent American-style options, allowing exercise at any point before or at expiration, which introduces additional complexity.
- **Transaction costs and taxes** – the model does not consider transaction costs or taxes, which can be significant in real-world investment decisions.

Transaction costs and taxes: The model does not consider transaction costs or taxes, which can be significant in real-world investment decisions.

3. Project Appraisal and Risk

Learning Objectives

- 5.3.1 Be able to apply the use of sensitivity analysis in evaluating investment projects
- 5.3.2 Understand the use of Monte Carlo simulation in evaluating investment projects
- 5.3.3 Understand how environmental, social and governance (ESG) issues can affect capital investment decisions

A high degree of risk and uncertainty is associated with capital investments as all decisions are based on forecasts and estimated data. This section looks at some methods available for assessing and minimising the risks involved in undertaking capital investments.

3.1 Sensitivity Analysis

Projects and investments are inherently uncertain, and assumptions made during the planning phase may not always hold true. Sensitivity analysis helps quantify the degree of uncertainty by assessing how changes in key variables affect project outcomes. It allows decision-makers to visualise the range of potential outcomes and **associated** risks. In so doing, sensitivity analysis reveals which variables are most sensitive to changes in project outcomes. Questions are asked such as 'what would happen to the net cash flow if variable cost per unit were to increase by 20%?' or '*by how much would sales have to decrease for the investment to become financially non-viable?*'. If a small change in a particular variable leads to a significant change in project profitability or risk, it indicates a vulnerability that requires closer monitoring and management.

Sensitivity analysis not only identifies potential risks but also helps in developing risk mitigation strategies. By understanding which variables have the most significant impact on project outcomes, decision-makers can focus on managing and mitigating those specific risks.

Example

Norton Ltd is considering investing £500,000 in equipment in the form of a new machine. Sales of the new product to be manufactured by the machine are expected to be £600,000 per annum continuing over three years. The variable costs of these sales are estimated at £350,000 and fixed costs are expected to increase by £40,000. At the end of the three-year period the machine will be sold for £80,000. Cost of capital is 15%.

Note that the 3-year annuity factor at 15% is 2.283.

Determine how changes in each of the variables associated with the project could alter the decision to purchase the machine.

Solution

First calculate the NPV making sure the PV of each line item is shown:

Year	Cash Flow (£)	15% DF/AF	PV (£)
1-3	Sales 600,000	2.283	1,369,800
1-3	Variable Costs (350,000)	2.283	(799,050)
1-3	Contribution		570,750
1-3	Fixed Costs (40,000)	2.283	(91,320)
3	Scrap Value 80,000	0.658	52,640
0	Initial Investment (500,000)	1.000	(500,000)
			32,070

Since the NPV is positive, the investment is financially worthwhile. For this to change, the NPV must become negative: ie, it must fall by at least £32,070.

Sales Revenue

Must decrease by 2.3% ($32,070/1,369,800$)

Variable Cost

Must increase by 4% ($32,070/799,050$)

Fixed Costs

Must increase by 35% ($32,070/91,320$)

Initial Investment

Must increase by 6.4% ($32,070/500,000$)

Scrap Proceeds

Must decrease by 61% ($32,070/52,640$)

3.2 Monte Carlo Simulation

Monte Carlo simulation is a powerful analytical technique used in finance to evaluate investment projects, assess risk, and make informed decisions. It relies on random sampling and repeated iterations to model various possible outcomes of an investment, providing a more comprehensive and probabilistic view of the project's potential performance. Here's how Monte Carlo simulation is used in evaluating investment projects:

- **Step 1** – to begin a Monte Carlo simulation, the analyst identifies the key input parameters and assumptions that influence the investment project. These can include variables like revenue growth rates, cost estimates, interest rates, and market conditions.
- **Step 2** – for each input parameter, probability distributions are assigned to represent the range of possible values. Common distributions include normal or uniform distributions. The choice of distribution depends on the understanding of the parameter and its uncertainty. Some variables may have known distributions, while others may require estimation.
- **Step 3** – the simulation involves running a large number of iterations (often in the thousands or more) where random values are sampled from the specified probability distributions for each input parameter. For each iteration, the investment's cash flows or other relevant financial metrics are calculated based on the sampled values.
- **Step 4** – the simulation produces a distribution of possible outcomes for the investment's performance metrics, such as Net Present Value (NPV), Internal Rate of Return (IRR), or payback period. These distributions provide insights into the range of potential results and the likelihood of different outcomes.
- **Step 5** – Monte Carlo simulation enables analysts to assess the risk associated with the investment project. By analysing the distribution of results, they can identify measures of risk, such as standard deviations or confidence intervals. Sensitivity analysis can also be performed to determine which input parameters have the most significant impact on the project's performance.
- **Step 6** – armed with a probabilistic view of the project's potential outcomes, decision-makers can make more informed decisions. The risk-adjusted returns of the investment can be assessed, taking into account the likelihood of achieving specific financial targets or the probability of a negative outcome. Monte Carlo simulation helps quantify uncertainty and informs decisions regarding project selection, financing or risk mitigation strategies.

3.2.1 Advantages of Monte Carlo Simulation in Investment Evaluation

- Monte Carlo simulation considers multiple scenarios, providing a more complete understanding of investment risk compared to traditional deterministic methods.
- It offers a range of possible outcomes and their associated probabilities, aiding in decision-making under uncertainty.
- The technique can be applied to various investment types, from real estate and capital projects to financial portfolios.
- It allows analysts to identify and prioritise the most influential factors affecting the investment's performance.

3.2.2 Limitations of Monte Carlo Simulation

- Setting up and running Monte Carlo simulations can be complex and time-consuming, requiring expertise in probability and statistics.
- Reliable data on input parameters and their probability distributions are essential for accurate simulations. These may not always be available.
- The results are highly dependent on the choice of probability distributions and the accuracy of assumptions, so careful consideration is needed.

3.3 ESG Issues

Environmental, Social, and Governance (ESG) factors can significantly influence capital investment decisions made by companies. ESG considerations have become integral to strategic planning and investment assessments due to their impact on risk, reputation, and long-term sustainability. ESG factors can affect capital investment decisions in the following areas:

Risk Assessment – companies evaluate how environmental factors, such as climate change, resource availability, and pollution regulations, can impact the feasibility and risk of capital projects. Investments in projects that are vulnerable to environmental risks may carry higher long-term costs and uncertainties. ESG considerations related to social factors, including labour practices, community relations, and supply chain ethics, influence the assessment of capital projects. Projects that incorporate ethical labour practices and maintain positive community relationships are less likely to face disruptions and negative publicity.

Effective governance is critical for project success. Companies assess ESG governance factors, like board independence, ethical conduct, and risk management practices, to determine the viability of capital investments. Projects that align with strong governance principles are perceived as lower-risk investments.

- **Reputation Management** – companies are increasingly conscious of the impact of ESG factors on their reputation. Capital investments that align with positive ESG principles and contribute to sustainability can enhance a company's brand and reputation. Conversely, investments that risk negative publicity or harm to stakeholders can lead to reputational damage.
- **Cost of Capital** – ESG performance can affect a company's cost of capital, including borrowing costs. Lenders and investors may offer favourable terms to companies with strong ESG practices, as they are perceived as less risky. Lower borrowing costs make capital investments more economically attractive.
- **Market Access and Demand** – capital investments that align with ESG trends and consumer preferences are more likely to meet market demand. Certain sustainable products and services may often have a broader customer base and higher market acceptance, potentially leading to increased sales and revenue.
- **Regulatory Compliance** – ESG regulations are evolving in many regions. Companies must consider the regulatory landscape when evaluating capital investments. Projects that comply with current and anticipated ESG regulations are less likely to encounter costly legal issues, fines, or delays.

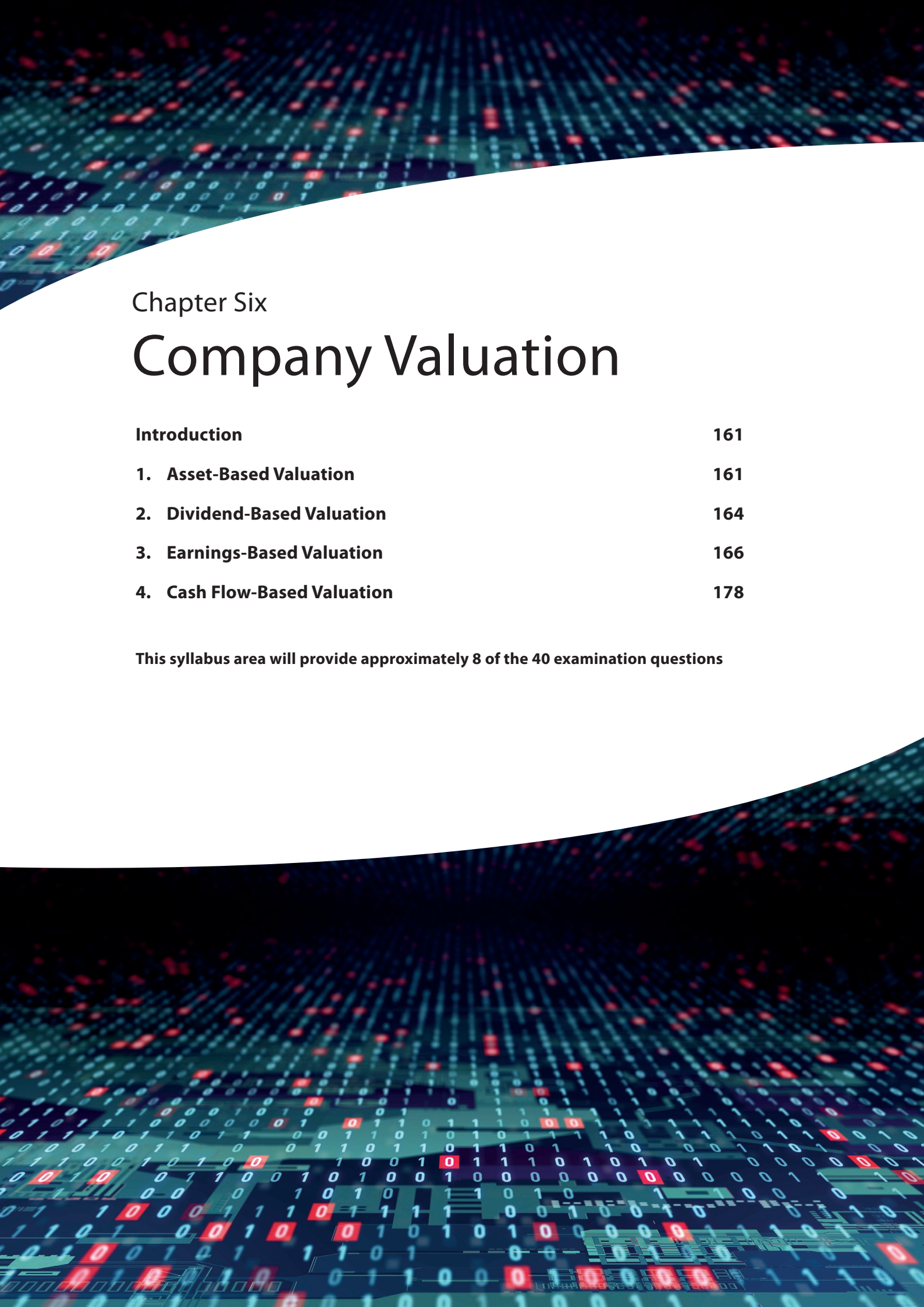
- **Long-Term Sustainability** – companies assess whether capital investments align with their long-term sustainability goals and objectives. They consider how investments contribute to sustainability, not just in financial terms but also in environmental and social dimensions.
- **Competitive Advantage** – investments that embrace ESG-focused technologies or practices can provide a competitive edge. Companies that innovate in sustainability may capture market share and outperform competitors in the long run, which is an important consideration in capital allocation.
- **Stakeholder Engagement** – engaging with stakeholders, including investors, customers, and employees, is crucial. Companies that solicit and incorporate ESG feedback from stakeholders into their capital investment decisions are better positioned to meet expectations, build trust and reduce potential conflicts.

The International Sustainability Standards Board's introduction of **IFRS S1 and S2** is also significant. IFRS S1 sets out general requirements for sustainability disclosures, while IFRS S2 focuses specifically on climate-related disclosures. These disclosures may influence how companies assess and prioritise capital investment decisions. As ESG considerations continue to evolve and gain prominence, they will increasingly shape the way companies allocate capital across various industries, fostering sustainability and resilience in the business landscape.

End of Chapter Questions

Think of an answer for each question and refer to the appropriate section for confirmation.

1. **Define ROCE (Return on Capital Employed) and explain its significance as an investment appraisal technique for businesses.**
Answer reference: Section 1.2
2. **Describe the advantages of using ROCE (Return on Capital Employed) as an investment appraisal metric for businesses.**
Answer reference: Section 1.2.2
3. **How is NPV used as a decision-making tool, and what does a positive or negative NPV indicate about the financial viability of an investment?**
Answer reference: Section 1.3
4. **Explain the concept of the internal rate of return (IRR) in investment appraisal.**
Answer reference: Section 1.4
5. **Describe the concept of the multiple IRR problem and why it occurs.**
Answer reference: Section 1.4.1
6. **Explain the concept of Modified Internal Rate of Return (MIRR) and how it addresses the limitations of the traditional Internal Rate of Return (IRR) method.**
Answer reference: Section 1.5
7. **How does MIRR compare with IRR and NPV?**
Answer reference: Section 1.5
8. **Explain the concept of Adjusted Present Value (APV) as a financial valuation method.**
Answer reference: Section 1.6
9. **What are the advantages of APV?**
Answer reference: Section 1.6.2
10. **Explain the concept of real options in the context of investment appraisal.**
Answer reference: Section 2.1
11. **How is the option to expand similar to a call option, and what does it allow the firm to do?**
Answer reference: Section 2.1.1
12. **Explain the concept of the option to withdraw as a real option in investment appraisal.**
Answer reference: Section 2.1.2
13. **Explain the purpose and significance of sensitivity analysis in the context of project planning and investment decisions.**
Answer reference: Section 3.1



Chapter Six

Company Valuation

Introduction	161
1. Asset-Based Valuation	161
2. Dividend-Based Valuation	164
3. Earnings-Based Valuation	166
4. Cash Flow-Based Valuation	178

This syllabus area will provide approximately 8 of the 40 examination questions



Introduction

Company valuation is a fundamental concept in corporate finance. It is the process of determining the monetary worth of a business or a company, and it plays a pivotal role in decision-making for investors, analysts and businesses themselves. Valuing a company involves assessing its overall financial health, future prospects and potential risks to arrive at a fair and accurate estimate of its value.

The reasons for conducting company valuations are diverse and can include making investment decisions, facilitating mergers and acquisitions, raising capital, financial reporting and even resolving legal disputes. The methods and approaches used for valuation can vary depending on the nature of the business, industry and specific goals of the valuation.

In this chapter, we will explore the various methods and techniques employed to determine the value of a company including asset-based, earnings-based and cash flow-based (including dividend-based) methods.

1. Asset-Based Valuation

Learning Objective

- 6.1.1 Know the difference between: market value; transaction value; book value
- 6.1.2 Understand the uses, assumptions and limitations of asset-based valuations
- 6.1.3 Be able to analyse equity value using an asset-based valuation approach

Asset-based valuation is a method used to determine the value of a company based on the assets it holds. Within this approach, it's essential to distinguish between market value, **transaction value**, and book value.

Market value, in the context of asset-based valuation, represents the current fair market value of the company's assets less liabilities. This value is determined by assessing what the assets would fetch in an open and competitive market. Market value can vary significantly from the historical or accounting values of assets because it reflects current market conditions, demand and supply dynamics. It provides a real-world assessment of what the assets are worth in the context of a potential sale or liquidation. The valuer restates the balance sheet of the company, introducing the market value of individual assets. This is known as the summation method. The resulting balance sheet value will be the valuation under the cost approach and the market value basis. If provision for the realisation of assets and liquidation costs is included, the valuation will be on the liquidation basis.

Transaction value refers to the actual price or consideration agreed upon in a specific transaction. This is the value that the buyer and seller have negotiated and are willing to exchange for the assets or the entire business. Transaction value can differ from both market value and book value. It reflects the unique circumstances, motivations, and terms of a particular deal. The transaction value may include factors not within market value, such as the benefit of synergies.

Book value, also known as the carrying value or accounting value, is the value of assets as reported on a company's balance sheet. It is calculated by subtracting a company's liabilities from its assets. Book value provides a historical perspective on the cost of acquiring and maintaining assets. However, it may not reflect their current market or transaction values, especially if asset values have changed significantly since their acquisition.

1.1 Steps in Asset-Based Valuation

Step 1 – Identify and Categorise Assets

- Begin by listing and categorising all of the company's assets.
- Assets can be grouped into tangible, intangible and financial categories.

Step 2 – Determine Asset Values

- Assign values to each category of assets using appropriate methods:
 - For tangible assets, consider their market value (what they would sell for today in an open market), book value (as listed on the balance sheet), or appraised value.
 - For financial assets, use their market value, which is often readily available.

Step 3 – Adjust for Liabilities

- Calculate the company's **net asset value (NAV)** by subtracting all liabilities, including debts, obligations, and contingent liabilities, from the total asset value.

$$\text{Net Asset Value} = \text{Total Assets} - \text{Total Liabilities.}$$

Step 4 – Consider Intangible Assets

- Evaluate and assign values to intangible assets, such as patents. This may involve specialised valuation methods and expertise.

Step 5 – Apply Discounts

- Consider applying discounts or adjustments if warranted. This may be necessary for assets that are not easily marketable or are subject to restrictions.

Exercise 6.1

BC Manufacturing Company has total assets worth £2,500,000, including tangible assets of £1,800,000 and intangible assets (patents) independently valued at £500,000. The company has liabilities of £800,000. Calculate the equity value of the company using the asset-based approach.

Solution

Net Asset Value (NAV) = Total Assets – Total Liabilities

NAV = £1,800,000 + £500,000 – £800,000 NAV = £1,500,000

So, the value of ABC Manufacturing Company using the asset-based approach is £1,500,000.

1.2 Uses and Limitations of Asset-Based Valuation

The asset-based valuation approach is particularly useful for businesses with substantial tangible assets, such as real estate, equipment, inventory and machinery. Asset-based valuation can be employed in various scenarios, including bankruptcy proceedings, liquidation, mergers and acquisitions and when a company's assets are a primary source of value.

It is important to note, however, that asset-based valuation has limitations. It does not consider a company's future income-generating potential or cash flows, which are often the most important determinants of value; as such, asset-based values are typically viewed as a lower boundary or break-up value. The method may also significantly understate value in companies with substantial intangible assets, intellectual property, brand value or future growth potential, making income-based or market-based approaches more suitable in those cases. In addition, the results may be influenced by accounting conventions: balance sheet figures often reflect historical cost rather than current market value, and may overlook off-balance sheet assets and liabilities such as contingent obligations, lease commitments or internally-generated intangibles. Consequently, while asset-based valuation can provide a useful reference point, particularly in asset-heavy or distressed situations, it may not capture the full economic value of a going concern.

2. Dividend-Based Valuation

Learning Objective

- 6.2.1 Understand the uses, assumptions and limitations of dividend-based valuations
- 6.2.2 Be able to analyse equity value using the dividend-based valuation approach

Dividend-based valuation is a method used to determine the value of a company's stock by analysing its expected future dividend payments to shareholders. This approach is commonly used for valuing mature, dividend-paying companies. It assumes that the value of a stock (the 'intrinsic' value) is based on the present value of its expected future dividends.

2.1 Uses of Dividend-Based Valuations

- **Income generation** – investors often rely on dividend-based valuations to identify shares that provide a steady income stream. Companies with a history of consistent dividend payouts are attractive to income-oriented investors.
- **Dividend yield comparison** – comparing dividend yields allows investors to evaluate the relative attractiveness of different stocks. This method helps in selecting investments that align with an investor's income goals and risk tolerance.
- **Market sentiment** – dividend payments can also serve as indicators of a company's financial health. A consistent or increasing dividend may signal confidence from management in the company's future earnings and stability.

2.2 Gordon Growth Model

The Gordon Growth Model is sometimes referred to as the dividend growth model (DGM) or the dividend discount model (DDM). The share price is calculated by discounting the future dividends at the shareholders' required rate of return:

$$P_0 = \frac{D_0 (1+g)}{K_e - g}$$

Where:

P_0 is the share price today

K_e is the cost of equity

g is the growth rate for dividends

D_0 is the most recent dividend

Exercise 6.2

Target paid a dividend of £250,000 this year. The required rate of return for shareholders is currently 14%.

Calculate the value of the company assuming the current level of dividends is expected to continue and grow by 4% per annum. Also, calculate the value per share if there are 1 million shares in issue.

Solution

The following formula can be used:

$$P_0 = \frac{D_0 (1+g)}{K_e - g}$$

$$P_0 = \frac{250,000 (1.04)}{(0.14 - 0.04)} = £2,600,000$$

The value of equity in total is £2,600,000

If there are 1 million shares outstanding, the value of each share would therefore be £2.60.

Assumptions

- **Constant dividend growth rate** – the Gordon Growth Model assumes a constant growth rate in perpetuity. It assumes that the dividends will grow at a stable rate indefinitely. This assumption may not be realistic for companies with fluctuating earnings or those in cyclical industries.
- **Stable dividend payments** – the model assumes a stable and predictable dividend payment pattern. This implies that the company has a consistent history of paying dividends and that this pattern will continue in the future.
- **Reinvestment of earnings** – the model assumes that the company reinvests a portion of its earnings to sustain the constant dividend growth rate. This implies that the company has profitable investment opportunities that allow it to maintain the assumed growth rate.
- **Infinite time horizon** – the Gordon Growth Model assumes an infinite time horizon, meaning that the constant growth rate continues indefinitely. This assumption simplifies the valuation process but may not reflect real-world scenarios where economic, industry or company-specific factors can change over time.
- **Required rate of return exceeds dividend growth rate** – the model assumes that the required rate of return or cost of equity is greater than the dividend growth rate. This ensures that the present value of future dividends does not become infinite. If the growth rate exceeds the discount rate, the model no longer works.

Limitations of Dividend-Based Valuations

- **Ignores growth opportunities** – dividend-based valuations may not be suitable for high-growth companies that prefer to reinvest profits into the business instead of distributing them as dividends. This approach can lead to undervaluation.
- **Sensitivity to market conditions** – dividend yields are inversely related to stock prices. During market downturns, dividend yields may rise not because of increased dividends but due to falling stock prices, potentially misleading investors.
- **Vulnerability to dividend cuts** – companies facing financial challenges may cut or eliminate dividends. Relying solely on dividend-based valuations without considering the financial health of the company can expose investors to significant risks. The level of dividend cover (that is the relationship of earnings to dividends paid) is one means of considering the likely stability of future dividend payments.

3. Earnings-Based Valuation

Learning Objective

- 6.3.1 Know the difference between intrinsic value and relative value
- 6.3.2 Understand the uses, assumptions and limitations of earnings-based valuations
- 6.3.3 Be able to analyse equity value using P/E multiples
- 6.3.4 Be able to analyse enterprise value using EBIT/EBITDA multiples
- 6.3.5 Understand the differences between EBIT and EBITDA and when it is appropriate to use each one
- 6.5.1 Know what is meant by enterprise value, its uses and how it differs from equity value

3.1 Introduction to Earnings-Based Valuation

Earnings-based valuation is a method used to determine the value of a company by analysing its earnings, typically in the form of net income or **earnings per share (EPS)**. This approach is commonly used for valuing companies and is particularly relevant for businesses with a history of stable and predictable earnings. It is referred to as a 'relative' valuation approach because the company is valued in comparison to similar companies. This is in contrast to 'intrinsic' value calculations such as cash flow-based methods that estimated true worth of an asset based on its fundamental characteristics and underlying factors, ie, an attempt to determine the actual value of an asset, irrespective of market sentiment or the prices at which similar assets are trading. The differences between the two are discussed below.

3.1.1 Intrinsic Value vs Relative Value

Intrinsic value represents the true, inherent worth of a company or its share, based on its fundamentals such as earnings, dividends, growth rate and risk. It is often calculated using valuation models like discounted cash flow (DCF) or dividend discount models (DDM).

Relative value, on the other hand, involves comparing a company's valuation metrics to those of its peers or the overall market. It doesn't focus on the absolute worth of the company but rather its value in relation to other similar companies or market benchmarks.

Main differences:

Difference	Intrinsic value	Relative value
Focus on company specifics versus market comparison	Intrinsic value primarily considers internal factors specific to the company, such as projected cash flows, earnings, and dividends. It aims to determine the fair value of the company irrespective of market conditions.	Relative value compares a company's valuation metrics (eg, P/E ratio, EV/EBITDA) with those of other companies or industry averages. It provides a sense of how the market values the company relative to its peers.
Absolute versus comparative approach	Takes an absolute approach by assessing the company's standalone value based on its unique characteristics. It is less concerned with external market dynamics.	Utilises a comparative approach, assessing a company's value in the context of its industry or market. It considers how the company stacks up against others in terms of valuation multiples.
Long-term versus short-term perspective	Typically involves a long-term perspective, considering future cash flows and earnings growth. It aims to estimate the company's worth over an extended period.	Often provides insights into short-to-medium term market dynamics. It is more influenced by current market sentiment and comparable company performance.
Subjectivity versus objectivity	Involves subjective elements as assumptions about future cash flows, discount rates and growth rates play a significant role. It requires more in-depth analysis and forecasting.	Relies more on objective, observable metrics. Valuation multiples used for comparison are usually based on historical or current market data, requiring less subjective estimation.
Risk considerations	Incorporates a company's specific risk factors into the valuation model, aiming to reflect the unique risks associated with the business.	Reflects the market's perception of risk, which may not capture all the specific risk factors associated with a particular company.

As earnings-based valuations play a crucial role in assessing the financial health and investment potential of a company it is essential to understand both the applications and the inherent assumptions and limitations associated with the approach.

3.1.2 Uses of Earnings-Based Valuations

- **Investment decision-making** – earnings-based valuations are widely used by investors to assess whether a share is overvalued or undervalued. A low P/E ratio, for instance, might suggest that a share is relatively inexpensive, while a high P/E ratio may indicate the opposite.
- **Comparative analysis** – investors use earnings-based metrics for comparative analysis within industries or sectors. Comparing P/E ratios or earnings yield helps in identifying companies with attractive valuations relative to their earnings.
- **Market sentiment** – changes in a company's earnings can reflect shifts in market sentiment. Positive earnings growth may lead to increased investor confidence, while declining earnings may raise concerns and impact share prices.

3.1.3 Assumptions in Earnings-Based Valuations

- **Earnings stability** – earnings-based valuations assume a level of stability in a company's earnings. This assumption implies that historical earnings trends will continue in the future, which may not always be the case, especially for companies in dynamic industries.
- **Correlation with future cash flow** – the assumption is that a company's earnings are a reliable indicator of its future cash flows. While earnings are a crucial factor, other elements such as capital expenditures and working capital changes also influence cash flows.
- **Market efficiency** – earnings-based valuations assume market efficiency, meaning that stock prices quickly adjust to new information. If markets are not efficient, investors may find mispriced stocks based on historical earnings.

3.1.4 Limitations of Earnings-Based Valuations

- **Quality of earnings** – earnings quality varies among companies. Earnings-based valuations may not account for differences in the quality of reported earnings, such as non-recurring items or accounting practices that can distort the true financial picture.
- **Single perspective** – relying solely on earnings-based metrics provides a one-dimensional view of a company's valuation. It may overlook other critical factors like balance sheet strength, growth prospects and competitive positioning.
- **Cyclicalities and economic factors** – industries sensitive to economic cycles may experience fluctuations in earnings. Earnings-based valuations may not adequately account for cyclicalities, leading to potential misjudgments during economic downturns or upturns.
- **Exclusion of non-financial factors** – earnings-based valuations focus primarily on financial metrics. They may not consider non-financial factors such as changes in management, regulatory developments or technological disruptions that can significantly impact a company's value.

3.2 Price-to-Earnings Ratio

The typical method of valuing a company based on its earnings levels is to use the **price to earnings (P/E) ratio**, calculated as:

$$\text{P/E ratio} = \frac{\text{Price per share}}{\text{Earnings per share}} = \frac{\text{Equity value}}{\text{Net income}}$$

The P/E ratio for a similar quoted company can be inserted into the rearranged formula along with the earnings per share of a company we wish to value. Solving for the missing figure will give us the required valuation.

Alternatively, the following formulae can be used:

$$\text{Company value} = \text{P/E ratio} \times \text{EPS} \times \text{number of issued ordinary shares}$$

$$\text{Company value} = \text{P/E ratio} \times \text{total earnings}$$

Advantages

- The P/E multiple is commonly used as it is based on earnings, which is recognised as the key driver of value (earnings power). The key assumption underlying the P/E valuation approach is that earnings multiples are similar for comparable quoted and unquoted companies. This may be appropriate where earnings are a good indicator of value, ie, not distorted by dubious accountancy practices, and of high quality, ie, a good indicator of underlying or trend earnings and not distorted by one-off exceptional items.
- It also requires that the comparables being used are similar, not only in terms of their business mix, but also in their capital structure and choice of accounting policies.

3.2.1 Problems with Using P/E Ratios

Finding wholly comparable companies in a peer group is difficult due to:

- differences in accounting policies
- different growth levels
- different levels of gearing
- different levels of liquidity, and
- different levels of business risk.

One of the reasons that earnings-based approaches work is that a company's earnings can be virtually equivalent to its cash flow. This may be the case for a company that is in a stable market and is not expanding significantly. However, it will be a less reliable indicator of value where a company's cash flows and earnings are significantly different. This may occur due to dubious accounting practices, creation of provisions, high levels of capital expenditure and increases in working capital levels. It may

be better for analysts to base the P/E calculation on an 'adjusted' or 'headline' measure of EPS, rather than the accounting standard (IAS 33) reported EPS. An adjusted EPS should be prepared so as to focus on the trading performance of the business in the period and, as such, it eliminates one-offs such as exceptional items and revaluation gains and losses. Care must be taken, though, that all adjustments really are 'one-offs'; for example, a company that incurs restructuring costs every year should treat them as part of recurring earnings.

Moreover, the P/E approach cannot be used for loss-making companies (price to sales ratio (PSR), asset based or cash flow-based valuations will be more appropriate). The earnings per share figure is extremely susceptible to differences in accounting policies. It is affected by different inventory valuation, provisioning, **depreciation** and deferred taxation policies. Empirical studies show that P/E ratios diverge widely both between and within sectors. The P/E ratio is therefore very subjective and difficult to compare between companies, sectors and countries.

Ideally, the P/E ratio could be adjusted to reflect these differences. For example, it is usually the case that unlisted companies are valued at, say, a 30% discount to an equivalent listed company to reflect the lack of liquidity in the shares. However, the assumptions that need to be made and the theoretical nature of such adjustments mean that, if additional sophistication is required, it may be better to use a cash-based approach to valuation from the very start.

P/E ratios may also be based on 'pro-forma' earnings that have been adjusted to take account of the transaction under consideration. An example might be a flotation where the finance being raised is, for the most part, being used to reduce the indebtedness of the company. This is a common situation where the floating company was originally a management buy-out. The earnings are restated to allow for a much lower interest charge.

3.3 Enterprise and Equity Value

Enterprise value (EV) represents the total value of a business or enterprise to all providers of capital, including equity investors, preference share investors, debt investors and non-controlling (or **minority interests**). It can be calculated by adding the company's **market capitalisation** and the market value of its gross borrowings and deducting any cash balances. Short-term liquid financial investments that can readily be converted to cash are also deducted. Any additional sources of capital should also be added, ie, the market value of preference shares and non-controlling interests. In practice we may not have the information to put all sources of finance at market value, and so we can assume the latest balance sheet is a reasonable proxy where market value information is not available.

Enterprise value =

Equity value + Gross debt – Cash and cash equivalents + Preference shares + Non-controlling interests

Equity value = market capitalisation = number of ordinary shares x share price

In essence therefore:

Enterprise value	x
Less: Value of net debt and other interests	x
Equity value	x

Equity value represents the value of the business to the providers of equity finance. It is calculated after deducting the values of debt (net of cash and equivalents), preference shares and non-controlling interests from enterprise value.

Although it may seem more appropriate to focus on equity values at first sight, since we are trying to identify the value of the business to its equity investors, enterprise value has an important part to play in the valuation process. The reason for this is that it ignores the level of gearing and other related financial factors when calculating the value of any business. As such, it can be an easy and consistent way to value equity – first through calculating the enterprise value and then adding cash and **cash equivalents** and deducting the value of other sources of finance.

In addition, enterprise value is a useful benchmark for comparisons across companies. Since many companies in different countries will have different gearing levels, even though they are in the same industry, it will not be easy to compare their businesses based on equity values. A more appropriate comparison would be to look at multiples based on enterprise values. For example, multiples based on revenue, research and development costs and number of locations can be calculated and compared across the international sector.

When calculating a multiple on the basis of equity value, an earnings figure relevant to equity should be used (ie, after tax and non-controlling interests such as P/E ratio). Where the comparison is being made on the basis of enterprise value, an earnings figure, eg, **EBIT**, should be based upon profits available to all providers of finance (ie, before deducting interest and tax such as EBIT).

Finding a company on either a high or low multiple relative to its sector does not, of course, tell you whether or not the company is a good buy. An expensive company may be justifiably on a high multiple due to expectations of growth arising from its competitive advantages in the market in question. A cheap company may be on a low multiple because it has no distinguishing characteristics and can offer no competitive threat. Alternatively, it may be that the stock market has failed to value the company in question correctly. One of the objectives of analysis is to identify which is likely to be the correct answer.

3.3.1 Advantages of Using an Enterprise-Based Methodology

The main advantage here is that the business as a whole is valued, regardless of how it is being financed. It therefore can provide a measure of value which is independent of how the business is financed.

- It allows better comparison between different companies in the same sector, as it excludes the level of gearing in the different businesses.
- It allows a multiple to be calculated based on both EBIT and EBITDA, thus giving a relative valuation based on the trading activities of the business.

- It allows the valuer to focus on multiples where accounting differences between businesses may be minimised, for example, EBITDA multiples.
- It allows the valuer to exclude non-core assets from the valuation. Such non-core assets (non-operating assets) are then added to the enterprise value as part of the adjustments in moving from EV to equity.
- Enterprise value is useful for valuing businesses where a change of control is envisaged. It allows the potential purchaser to impose their own required capital structure.

3.3.2 Disadvantages of Using an Enterprise-Based Methodology

- It can be difficult to establish the market value of the borrowings, to deduct from enterprise value before arriving at the market value of the equity. Subtracting the book value of debt is not always a good proxy as interest rates may have changed and book values on the accounts may be out-of-date.
- It can also be difficult to establish a reasonable valuation for other sources of finance, such as minority interest and pension liabilities.
- Forecast EBIT and EBITDA measures are less readily available than forecast price-to-earnings ratios.

3.4 EBIT and EBITDA

EBIT and EBITDA are two widely used measures of operating performance.

3.4.1 Definitions and Relationship

EBIT (Earnings Before Interest and Tax)

EBIT measures profit generated from core operations after all operating expenses, including depreciation and amortisation (D&A) but before financing costs and tax.

$$\text{EBIT} = \text{Revenue} - \text{Operating Expenses (incl. D\&A)}$$

In many reporting formats, EBIT aligns closely with operating profit.

EBITDA (Earnings Before Interest, Tax, Depreciation and Amortisation)

EBITDA adds back D&A to EBIT:

$$\text{EBITDA} = \text{EBIT} + \text{Depreciation} + \text{Amortisation}$$

Because D&A are non-cash charges, EBITDA is always at least as large as EBIT. The difference between the two is simply the D&A expense.

3.4.2 Where EBIT and EBITDA Sit

Income Statement Item	Amount (£m)
Revenue	500
Operating expenses (excl. D&A)	(320)
Depreciation	(40)
Amortisation	(10)
EBIT (Operating Profit)	130
Add back: Depreciation	40
Add back: Amortisation	10
EBITDA	180
Interest expense	(15)
Tax expense	(25)
Net Income	90

This illustrates that EBITDA is a step above EBIT in the earnings cascade, reflecting profit before any non-cash charges for capital consumption.

Example

A company reports the following:

Revenue: £500 million

Operating expenses excluding D&A: £320 million

Depreciation: £40 million

Amortisation: £10 million

Interest expense: £15 million

Tax expense: £25 million

Step 1: Calculate EBIT

$$\text{EBIT} = 500 - (320 + 40 + 10) = 500 - 370 = \text{£130m}$$

Step 2: Calculate EBITDA

$$\text{EBITDA} = 130 + 40 + 10 = \text{£180m}$$

Step 3: Observe the relationship
EBITDA (£180m) exceeds EBIT (£130m) by £50m, which equals total D&A.

EBIT reflects economic profit after asset usage.

EBITDA shows cash-style earnings before reinvestment.

3.4.3 What Each Measure Captures

EBIT shows economic profit after using long-lived assets. Depreciation and amortisation represent the consumption of long-term assets. By incorporating them, EBIT incorporates the economic cost of using capital assets to generate revenue.

EBIT answers the question: how much profit do operations generate after recognising asset wear-and-tear? This makes EBIT central to long-term profitability and return-on-capital analysis.

EBITDA provides a proxy for cash-style operating earnings by excluding interest, tax, and non-cash charges, but it is not a true measure of cash flow. EBITDA removes D&A, giving an initial view of the cash-generating ability of operations before capex. EBITDA answers the question how much operating cash could the business generate before reinvestment, tax and financing? This makes EBITDA a convenient proxy for operating cash flow.

3.4.4 Use of EBIT

EBIT is preferred when asset consumption matters:

Comparing businesses with similar asset intensity

Depreciation is a real cost in capital-heavy sectors; EBIT captures it.

Valuing mature or asset-intensive firms

Utilities, transport, manufacturing, telecoms and energy often rely on EV/EBIT rather than EV/EBITDA.

Return-on-capital analysis

Metrics like ROIC and operating margin use EBIT because it reflects the cost of deployed capital over time.

Assessing sustainable profitability

When depreciation approximates maintenance capex, EBIT offers a more realistic view of through-cycle profitability than EBITDA.

3.4.5 Use of EBITDA

EBITDA is most helpful in enhancing comparability or assessing credit strength:

Comparing companies with different capital structures or accounting choices

EBITDA removes distortions from leverage, tax rates and depreciation methods.

Credit analysis and leverage metrics

Banks and rating agencies rely on EBITDA for ratios such as net debt/EBITDA.

Early-stage or rapidly scaling businesses

High depreciation from recent investment can depress EBIT; EBITDA isolates the underlying operational capacity.

Intangible-heavy or service-heavy industries

For example, in software or consulting firms that rely heavily on acquired customer lists or intellectual property, amortisation charges can be large even though they do not correspond to current operating

activity. In such cases, EBITDA offers a cleaner baseline for comparing underlying operating performance across periods.

EBITDA has several important limitations. First, it ignores capital expenditure. While depreciation is a non-cash charge, the underlying assets must eventually be repaired or replaced, meaning that in capital-intensive industries EBITDA can significantly overstate the cash truly available to equity or debt holders. Second, EBITDA excludes working capital movements and tax obligations, so it provides no insight into changes in receivables, payables or inventory, and offers a poor substitute for actual operating cash flow. Third, EBITDA can mask weak asset productivity: a company may report healthy EBITDA margins yet still generate a low return on invested capital, an issue that becomes evident when analysing EBIT instead.

It is also very important to note that EBITDA is not a GAAP or IFRS-compliant measure. Neither accounting framework provides an official definition, which means companies have considerable discretion in how they calculate it. Some firms exclude only depreciation and amortisation, while others remove a wide range of additional items such as restructuring charges, stock-based compensation, or foreign-exchange gains and losses. The growing use of “adjusted EBITDA” amplifies this variation, as management teams can decide which adjustments they consider non-recurring or non-core. The problem with this is that it introduces a high degree of subjectivity in that management can choose which items to exclude, allowing them to present a more favourable picture of performance. What counts as 'non-recurring' or 'non-core' is often debatable and frequent or aggressive adjustments can undermine comparability across companies and reduce the reliability of EBITDA as an indicator of underlying operating performance.

Because EBITDA is a non-GAAP measure, regulators require any reported figure to be reconciled to the nearest audited performance metric, typically net income or operating income, so that investors can see how it relates to recognised accounting results. For the same reason, EBITDA cannot appear on the face of the primary financial statements and is usually presented only in supplementary disclosures such as investor presentations, earnings releases or management discussion and analysis.

Despite this, EBITDA remains widely used because it simplifies comparison and provides a quick, if imperfect, proxy for operational cash generation.

3.5 Earnings Before Interest and Tax Multiple

Instead of using P/E ratios, which rely on a post-tax figure for earnings, it is possible to do a similar calculation based upon earnings before interest and tax (EBIT). Published EBIT multiples are not so widely available as P/E ratios.

$$\text{EBIT multiple} = \frac{\text{Enterprise value}}{\text{EBIT}}$$

The idea of the EBIT multiple is that it removes distortions caused by the company's gearing structure or tax position, which may change if the company is acquired and merged into a larger group.

Since the EBIT multiple is being based on an earnings figure before interest is paid, it is effectively valuing the whole of the firm rather than just the part of the firm that belongs to equity investors. The earnings before interest need to be used to pay off providers of debt as well as equity finance. In order to find the value of the firm's equity, the value of the debt financing will need to be deducted from the enterprise value calculated.

As with the P/E ratio, the EBIT multiple has problems of comparability across companies. Even though it is based on a pre-interest figure, it is nevertheless affected by the level of gearing, since it is possible that high levels of gearing may adversely affect the operating cash flows of the business if the levels of gearing are unsustainable.

3.5 Earnings Before Interest, Tax, Depreciation and Amortisation Multiple

It is possible to base earnings multiples on various other definitions of earnings. For example, a multiple based on earnings before interest, tax, depreciation and amortisation (EBITDA).

$$\text{EBITDA multiple} = \frac{\text{Enterprise value}}{\text{EBITDA}}$$

The benefit of EBITDA multiples is that they strip out the accounting items of depreciation and **amortisation**, which may vary substantially between companies at different stages of their life cycle. EBITDA therefore provides a better basis for comparison between companies, as well as offering the same advantages as the EBIT multiples in that the multiples exclude the impact of a company's gearing structure or tax position. In addition, by excluding two of the main non-cash expenses, the EBITDA multiple is moving towards a normalised cash-based figure for the company in question.

EV/EBITDA is widely regarded as the most practical multiple in investment banking and private equity, as it enables cross-company comparison irrespective of capital structure and depreciation policy.

Exercise 6.3

Use the following information to derive an Equity Value range for private company Build Limited, based on multiples calculated for:

- a. EBIT
- b. EBITDA
- c. Revenue
- d. Net asset value

	All figures in £m	
Build Limited	2025 Historic	2026 Forecast
Revenue	39.6	42.1
Operating profit	8.7	9.2
Depreciation	0.5	0.6
Amortisation	0.3	0.3
Net asset value	24.4	
Net debt	13.0	

The closest comparable company to Build Limited has been identified as its competitor House plc, for which you have been able to ascertain the following financial data:

	All figures in £m	
House plc	2025 Historic	2026 Forecast
Revenue	57.7	61.9
Operating profit	10.0	12.6
Depreciation	2.2	2.2
Amortisation	–	–
Net asset value	48.1	
Net debt	25.0	

Today's share price for House plc is 175p. House has 27,300,000 shares in issue.

Solution

Stage One – Calculating Multiples for House plc

Equity value = $£1.75 \times 27.3\text{m} = £47.8\text{m}$

Enterprise value = $£47.8\text{m} + £25.0\text{m} = £72.8\text{m}$

	2025	2026
EV/EBIT multiples	$72.8/10 = 7.3\times$	$72.8/12.6 = 5.8\times$
EV/EBITDA multiples	$72.8/(10+2.2) = 6.0\times$	$72.8/(12.6+2.2) = 4.9\times$
EV/Revenue multiples	$72.8/57.7 = 1.3\times$	$72.8/61.9 = 1.2\times$
NAV multiples	$47.8/48.1 = 1.0\times$	

Stage Two – Apply Multiples to Value Build

Valuation based on:	2025	2026
EBIT	$7.3\times \times £8.7\text{m} = £63.5\text{m (EV)}$	$5.8\times \times £9.2\text{m} = £53.4\text{m (EV)}$
EBITDA	$6.0\times \times £9.5\text{m} = £57.0\text{m (EV)}$	$4.9\times \times £10.1\text{m} = £49.4\text{m (EV)}$
Revenue	$1.3\times \times £39.6\text{m} = £51.4\text{m (EV)}$	$1.2\times \times £42.1\text{m} = £50.5\text{m (EV)}$
NAV	$1.0\times \times £24.4\text{m} = £24.4\text{m (EqV)}$	

EV = Enterprise value MV = Equity value

Suggested valuation range (EV): $£50\text{m} - £55\text{m}$; Equity value range (after deduction of Build's net debt of $£13\text{m}$) $£37\text{m} - £42\text{m}$.

With a discount of 30% for a private company valuation, reflecting lack of marketability of the shares (MV): $£26\text{m} - £30\text{m}$.

4. Cash Flow-Based Valuation

Learning Objective

- 6.4.1 Understand the uses, assumptions and limitations of cash flow-based valuations
- 6.4.2 Be able to calculate equity value using a cash flow-based valuation model (including growth)
- 6.5.2 Be able to analyse enterprise value using a cash flow-based valuation approach incorporating free cash flows (including adjustments for normalised working capital) and terminal value and varying time horizons and growth assumptions

The dividend valuation method can be used to value a company on the basis of its cash dividends. As such, it is particularly appropriate to investors with small stakes in the company who only get the dividends determined by the directors. The cash valuation used here focuses on the cash that the business generates before investors have received their returns. It is of use to a controlling shareholder who can decide whether to reinvest this 'free cash flow' of the business or to pay it out as a dividend.

4.1 Uses, Assumptions and Limitations

4.1.1 Uses of Cash Flow-Based Valuations

- **Financial health assessment** – cash flow-based valuations provide a holistic view of a company's financial health by focusing on the actual cash generated from its operations. This is crucial for assessing a company's ability to meet its obligations, invest in growth and return value to shareholders.
- **Investment decision-making** – investors use cash flow metrics to evaluate the investment attractiveness of a company. Positive free cash flow signals that a company has surplus funds that can be used for dividends, share buybacks, debt reduction or strategic investments.
- **Debt servicing capacity** – cash flow-based valuations are instrumental in evaluating a company's capacity to service its debt. By comparing free cash flow to debt obligations, investors can gauge whether a company has sufficient liquidity to meet its debt commitments.

4.1.2 Assumptions in Cash Flow-Based Valuations

- **Consistency in cash flow patterns** – cash flow-based valuations assume a degree of consistency in a company's cash flow patterns. This assumption implies that historical cash flow trends will continue in the future, which may not always be the case, especially during periods of economic volatility.
- **Capital expenditure and working capital efficiency** – the assumption is that a company efficiently manages its capital expenditures and working capital. Changes in these factors can impact cash flow, and the valuation assumes that historical efficiency levels will persist.
- **Reinvestment of cash** – cash flow-based valuations assume that surplus cash is reinvested in projects that generate positive returns. This implies that the company can identify and execute profitable investment opportunities to sustain or enhance its cash flow.

4.1.3 Limitations of Cash Flow-Based Valuations

- **Non-cash expenses** – valuations based on cash flow may not account for non-cash expenses such as depreciation and amortisation. While these are not cash outflows, they are important to consider in assessing a company's overall financial health.
- **Timing differences** – cash flow-based valuations may not capture the timing differences between when expenses are incurred and when cash is actually paid. This is particularly relevant in industries with extended payment cycles or where revenue recognition differs from cash receipts.
- **Vulnerability to economic cycles** – companies, especially those in cyclical industries, may experience fluctuations in cash flows tied to economic cycles. Cash flow-based valuations may not fully account for these variations, leading to potential misjudgements.
- **Complexity in forecasting** – forecasting future cash flows involves inherent uncertainties. Small changes in assumptions, especially for long-term projections, can significantly impact the valuation. This complexity adds a layer of subjectivity to the valuation process.

4.2 Free Cash Flow

In order to produce a cash flow-based valuation of a company, it is first necessary to estimate the cash flows the business can generate from its operations. This calculation is often referred to as 'free cash flow' and it can be estimated in the following three ways:

1. Free cash flow to the enterprise (including capital allowances).
2. Free cash flow to the enterprise (assuming depreciation is tax deductible).
3. **Free cash flow to equity (FCFE).**

We will provide definitions of all three measures, then look at when each might be appropriate to use.

4.2.1 Definition 1 – Free Cash Flow to the Enterprise (including Capital Allowances)

Free cash flow to the enterprise or **free cash flow to the firm (FCFF)** is the total amount of cash the company generates after funding purchases of non-current assets and any required increases in working capital, but before any financing flows such as interest, dividends or debt capital repayments. It is termed 'free cash flow to the enterprise' as it gives the flows available to all providers of capital (ie, both debt and equity).

A pro-forma calculation for FCFF including capital allowances is as follows:

FCFF	£
Earnings before interest and tax	x
+/- Non-cash items	x/(x)
Cash EBIT	x
Less: Cash taxes (Cash EBIT × tax rate)	(x)
Add: Tax relief for capital allowances	x
Less: Capital expenditure	(x)
Less/add: (Increase)/decrease in working capital	(x)/x
Free cash flow to the enterprise	x

Cash EBIT

The starting point for the calculation is the firm's operating profit (EBIT). This is then adjusted for non-cash items, such as depreciation, impairment costs and increases/decreases in provisions. For instance, depreciation and impairment expenses should be added back and the release of an unused provision should be deducted. This gives us a 'cash EBIT' figure.

Tax

We can then estimate the cash taxes figure by multiplying the cash EBIT figure by the prevailing tax rate. The calculated tax figure will differ from the tax charge in the **income statement** as it is based on a measure of profit pre-financing costs and it excludes accounting adjustments, which are largely disallowable for tax purposes. The calculated tax figure will also differ from the actual tax paid because no credit has been allowed for tax depreciation and this must be adjusted for in the next line in the pro forma via capital allowances.

Capital Allowances

The company will save tax through capital allowances. In the UK, relief is generally available for a company's non-current assets at a rate of 25% on a reducing balance. The impact on the free cash flow calculation will be the tax saving that this represents at the company's marginal cost of taxation.

Example

A company purchases a machine for £10,000 which it expects to use for a three-year project at the end of which it will be sold for an estimated £2,000. If the company pays tax at a rate of 30% and capital allowances are available at 25% on a reducing balance basis, what is the impact of the capital allowances on its free cash flow?

Year	Asset Pool		Capital Allowances Available	Tax Saving in Free Cash Flow	
	£		£	£	
1	10,000				
	(2,500)		2,500	750	(Time 1)
2	7,500				
	(1,875)		1,875	563	(Time 2)
3	5,625				
	(2,000)	Note 1			
	3,625	Note 2	3,625	1,088	(Time 3)

Note 1 – the disposal proceeds.

Note 2 – the remaining asset value, available for tax relief as a balancing allowance. If the disposal proceeds exceeded the tax written down value of £5,625, the allowances would be clawed back from the company via a balancing charge, giving rise to a cash outflow in the final period.

Capital Expenditure

This is the total amount of cash spent on purchasing new non-current assets less the proceeds from assets disposed of. When analysing past cash flow for a company, total capital expenditure should be included. However, when forecasting, it may be appropriate to limit capital expenditure to a replacement level (adjusted for inflation), on the basis that any additional investment represents an application of free cash flow. This will be the case if a business has reached a state where there is no opportunity for rapid growth in its markets through expansion of the asset base.

Working Capital

Any increase in working capital represents additional investment in the operating asset base of the business and reduces the cash available from profits in the short term. Working capital, in valuation, should include only those current assets and liabilities directly linked to operating activities. This typically covers inventories, trade receivables, trade payables, and other operating items such as prepayments and accruals. It should not include non-operating items such as surplus cash balances, short-term investments or interest-bearing liabilities.

Cash and near-cash items are excluded unless they are an essential part of the operating cycle (for example, cash holdings in a retail business). Similarly, overdrafts and the current portion of long-term interest-bearing debt are treated as part of overall financing rather than working capital and are considered separately in the valuation.

In practice, analysts focus on net working capital (NWC), which is defined as operating current assets minus operating current liabilities. Changes in NWC affect free cash flow because they reflect the cash tied up in, or released from, day-to-day operations. An increase in NWC absorbs cash and reduces free cash flow, while a decrease in NWC releases cash and increases free cash flow.

A critical step in valuation is to **normalise NWC**. Reported NWC in the financial statements may include temporary or non-recurring fluctuations, such as an unusual build up of receivables or a short-term reduction in inventory. These distortions can materially misstate sustainable free cash flows. By adjusting reported NWC to a normalised level representing the ongoing requirement to support operations, analysts ensure that free cash flow forecasts reflect the business's true operating needs. This normalisation directly impacts enterprise value, since misestimating working capital requirements can significantly overstate or understate the valuation of the firm.

Non-Operating Cash Flows

Any items excluded from the operating profit figure above need to be taken into account separately for the purpose of the cash flow valuation of the business. Where this is a series of one-off cash flows, they will need to be highlighted and valued as such. Where the cash flows relate to investments and deposits, the market value of the underlying investment is added into the investment, as noted above.

Exercise 6.4

Calculate the free cash flow to the enterprise of ABC Ltd, where the following data is given.

	£
EBIT	£100m
Depreciation	£40m
Accounting tax charge	£10m
Tax rate	30%
Capital expenditure	£30m
Capital allowances available in year	£50m
Increase in working capital pa	£2m

Solution

	£m
EBIT	100
+ Depreciation	40
Cash EBIT	140
– Tax (30% x cash EBIT)	(42)
+ Capital allowances relief (30% x 50m)	15
– Capital expenditure	(30)
– Increase in working capital	(2)
Free cash flow to the enterprise	81

Note: the accounting tax charge is irrelevant since it is not a cash item.

4.2.2 Definition 2 – Free Cash Flow to the Enterprise (Excluding Capital Allowances)

The second way to calculate free cash flow is commonly used where information on the company's capital allowances is not available.

It is calculated as follows:

FCFF	£m
Earnings before interest and tax (EBIT)	x
+/- Non-cash items (eg, depreciation)	x
Cash EBIT	x
Less: Taxes (EBIT × tax rate)	(x)
Less: Capital expenditure	x
Less/add: (Increase)/decrease in working capital	x
Free cash flow to the enterprise	x

The figures used are the same as method (1) above, with the important distinction in the tax calculation. Method (1) based the tax calculation on the cash EBIT number and adjusted separately for tax relief on non-current assets ie, capital allowances. However, we will not always have access to capital allowance information (for example if carrying out a valuation from publicly available financial information). In this case, method (2) is more appropriate. Here, we base the tax calculation on the EBIT number and in doing so assume that depreciation is tax deductible (ie, accounting depreciation = tax depreciation). There is thus no need for an additional capital allowances adjustment. We also assume that there are no other tax disallowable items impacting EBIT. In practice, this is not likely to be true – especially for UK companies – but it is generally assumed that the differences are not so significant as to invalidate the overall calculation.

4.2.3 Definition 3 – Free Cash Flow to Equity

The third calculation is of Free Cash Flow to Equity (FCFE). This calculates the total amount of cash the company generates after funding purchases of non-current assets and any required increases in working capital, and including any financing flows such as interest, preference dividends and debt capital repayments. It is termed ‘free cash flow to equity’ as it gives the flows available to the providers of equity capital (ie, after payments to other providers of capital).

It is calculated as follows:

FCFE	£
Net income	x
+/- Non-cash items	x
	x
Less: Capital expenditure	x
Less/add: Changes in working capital	x

Less: debt principal repayments	x
Add: new debt raised	x
Free cash flow to equity	x

The calculation starts from net income, in other words it is already after tax and interest. The non-cash items adjusted for in the next line, will therefore include non-cash operating expenses, finance costs and tax expenses. Capital expenditure and working capital are adjusted for as previously. Finally, as we are calculating free cash flow to equity, changes in debt capital in the year are included, with repayments shown as a cash outflow and any new debt raised as a cash inflow.

4.2.4 Evaluation of Choice of Method

For valuation purposes, free cash flow to the enterprise is a much more useful calculation. It gives us a valuation independent of the financing structure, which may alter as a result of the proposed acquisition etc. Considering free cash flow to the enterprise enables us to consider the value of the operations as a whole and then consider the financing structure separately.

Importantly, different types of cash flow should be discounted at different discount rates.

- **Free cash flow to the enterprise**, should be discounted at the weighted average cost of capital to give an enterprise value.
- **Free cash flow to equity** should be discounted at the cost of equity to give an equity value.

Exercise 6.5

You extract the following information from a company's financial statements:

- Earnings before interest and tax (EBIT) \$2,000
- Depreciation expense \$200
- Interest expense \$462
- Tax expense \$538
- Capital expenditure \$500
- Working capital increased in the year by \$100
- Debt repayments \$150
- The effective tax rate is 35%.

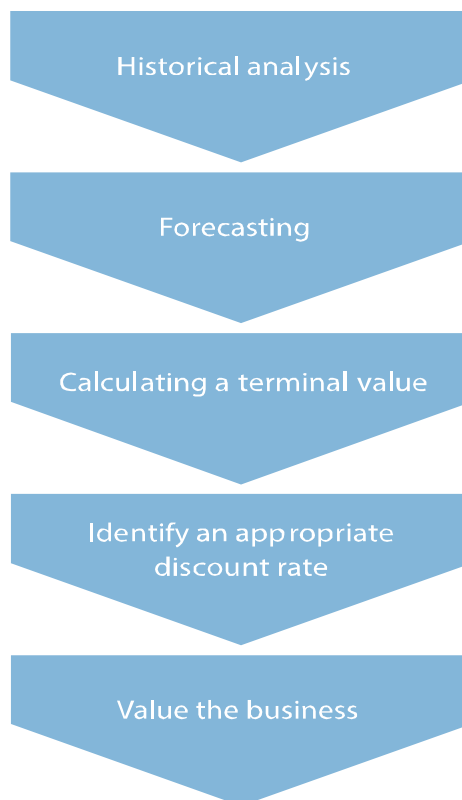
Calculate the company's free cash flow to the enterprise and free cash flow to equity. Can you provide a reconciliation of the two measures of free cash flow?

Solution

Calculating free cash flow to the firm:	\$
EBIT	2,000
+ depreciation	200
Cash EBIT	2,200
Tax ($35\% \times 2000$)	(700)
Capital expenditure	(500)
Increase in working capital	(100)
Free cash flow to the enterprise	900
Calculating free cash flow to equity:	\$
Net income ($2000 - 462 - 538$)	1,000
+ depreciation	200
Capital expenditure	(500)
Increase in working capital	(100)
Debt repayments	(150)
Free cash flow to equity	450
Free cash flow to equity	450
Interest (net of tax relief)	300
Debt repaid in the year	150
Free cash flow to the enterprise	900

4.3 Identifying and Forecasting Free Cash Flows

Any cash flow-based valuation necessitates forecasting cash performance for the business. The following key stages need to be followed in a cash flow-based valuation of a business.



4.3.1 Historical Analysis of Cash Flows

Historical Analysis

A company's free cash flow is derived from two main factors:

- Its ability to generate profits from its asset base.
- The level of reinvestment in the business.

In order to be able to forecast cash flows for the future by analysing these factors, it is important to analyse the past. By understanding how the company has generated cash in the past, we can examine the existing and forecast economic and industrial environment, to establish how it can continue to generate cash in the future.

Key factors to consider in the analysis will be as follows:

- The company's level of return on its asset base, ie, its return on capital employed.
- The amount of profits that have been reinvested in the business each year and the rise in profits this has caused in subsequent years.
- The amount of new external investment each year (debt and equity) and the rise in profits this has caused.

The analysis should go back over a five to ten-year period. The danger with selecting a shorter period for the analysis is that we may fail to identify a trend or cycle that has occurred over a longer period of time. The problem with analysing up to ten years in the past is that the earlier years will give information that may no longer be relevant or applicable.

Industry and Competitor Analysis

In conducting any historical analysis, it is important to place the results in context. It is, therefore, necessary to compare the company's performance to other similar companies in the same sector and to identify key factors affecting the sector's performance. Any differences between the company's performance and that of the sector in general should be investigated to identify the reasons for this. It may be that the company is a poor performer and, with good management, the return on capital could be improved substantially in the future. This would need to be taken into account in preparing any forecast.

Limitations of Historical Analysis

It should be remembered that any analysis based on published accounting information is going to be limited. Key limitations to be aware of include the following.

Accounts are usually prepared on an historic cost basis, with no allowance for inflation. This fact contains many possible risks for an analyst of a set of accounts. For example, the rate of return on assets purchased several years ago will appear artificially high, since current year profits are being compared with the historic cost of purchase. In addition, the depreciation charge in the accounts will be artificially low compared to the revenue that the related assets are generating. Even if inflation is fairly low, say at 5% pa, the cumulative effect of this could be significant, increasing prices by nearly 30% over a five-year period.

Various creative accounting techniques may be used to:

- increase or smooth profits, and
- understate assets and liabilities ('off balance sheet finance').

Although the above problems are being addressed by the introduction of new accounting standards and disclosures, analysis of past accounting data needs to be treated with care. This highlights the fact that valuation is not a pure science but involves substantial amounts of judgement. Any conclusions based on the analysis cannot be justified on a purely quantitative basis. The analyst will need to develop an understanding of the company and industry in question and much of the final valuation will be based on their judgement of these for the company's future prospects.

4.3.2 Forecasting Cash Flows

Free Cash Flows: The Explicit Forecasting Period

The valuation of the company in question will be based on two main elements, namely the explicit forecasting period and the terminal value. The explicit forecasting period is the period for which detailed cash flow forecasts are completed. The terminal value is a more simplistic forecast for the remainder of the company's life, based on simplifying assumptions for growth and rates of return.

Since the terminal value is based on simplifying assumptions and, hence, may be a less rigorous valuation technique, it is desirable to make it of less significance in the context of the overall valuation. This is achieved by extending the length of the explicit forecasting period, with its more detailed analysis of the company and its cash flows. The problem with extending the explicit period is that any cash flow forecast for years further into the future is inherently less reliable than one for a closer period of time. It may, therefore, be that the additional accuracy obtained from a longer explicit forecast is spurious and a simpler approach is just as good. As always, valuation techniques are not absolute measures, and a large element of judgement is required.

A theoretically sound approach is to make the explicit forecasting period the length of time for which the company is able to maintain a level of return on new investment in excess of the required returns to shareholders. The reason for this is considered below in relation to calculating the terminal value. In practice, analysts will usually establish a forecasting period of between five and ten years, depending on whether the company is in a stable or a growing industry.

Identifying Key Variables

In developing the forecast, the analyst will need to identify the key factors affecting cash flow over the forecast period. These will include:

- the economic and industry scenario
- the level of investment made by the company, and
- the return on investment.

Having identified the key characteristics of the industry, it is usually the case that demand will be the key limiting factor for the company. Having identified the anticipated level of demand, the level of investment needed to sustain that demand and the level of operating costs can be derived by making assumptions for **operating profit margins** and asset turnover.

Synergies

If the valuation is being undertaken for the purpose of an acquisition, any synergies that are expected to arise should be quantified separately in terms of their cash implications. Care needs to be taken relating to the timing of the cash flows. Cash outflows by way of negative synergies, for instance relating to restructuring costs, should not be forgotten. The present value of the synergies should be the maximum level of the bid premium in the transaction.

4.4 Terminal Value

4.4.1 The Purpose of Terminal Value Calculations

When valuing a company, its total value is usually broken down into two components: Total value of company's operations =

Present value of operating cash flows in the explicit forecast period

+

Present value of operating cash flows outside the explicit forecast period

The terminal value calculation is designed to estimate the present value of the cash flows outside of the explicit forecast period. It can be incorporated into the cash flow forecast as the value of the business at the end of the explicit forecast period. The present value of the cash flows in the explicit forecast period and the terminal value can then be discounted back using an appropriate cost of capital to give the value of the company today.

Exercise 6.6

Brando Ltd is expected to generate free cash flow of around £500,000 pa for the next five years. The valuer believes that a WACC of 20% is appropriate for Brando Ltd's area of business and calculates that an appropriate terminal value is £6m. Calculate the enterprise value of Brando Limited. The annuity factor for years 1 to 5 at 20% has been calculated as 2.99.

Solution

Time	Narrative	Cash Flow £'000	Discount Factor at 20%	Present Value £'000
1–5	Cash flow	500	2.99	1,495
5	Terminal value	6,000	$(1/(1+0.2)^5)$	2,411
Enterprise value =				3,906

The terminal value could be viewed conceptually in one of two ways. It could be seen as being the value for which the business could be sold at the end of the explicit forecast period. If an acquirer is planning to hold the business for several years and then dispose of it, then this will be the suitable approach. Alternatively, it could be viewed as being the present value of the future cash flows outside of the explicit forecast period at the end of the explicit period (in the above example, at Time 5). This would be appropriate if an acquirer is aiming to hold the business for the long term.

The enterprise value of the company is therefore £3,906,000 based on the free cash flow approach.

4.4.2 Calculation of Terminal Value

The terminal value can be calculated using a number of different approaches, ranging from the sophisticated to general rules of thumb. It may be appropriate to calculate terminal values using a number of different techniques. The values can then be compared and, if one approach gives a significantly different value, the reason for this can be investigated.

Possible approaches include the following:

- discounted cash flow-based approach, and
- price-to-earnings ratio approach.

4.4.3 Cash Flow-Based Approach – Assuming No Growth

The cash flow-based approach is similar in concept to the dividend valuation approach for valuing shares. The free cash flow is estimated for the year after the end of the explicit forecast period. It may then be assumed that the annual cash flow to infinity remains at this level, ie, we have a level perpetuity.

$$\text{Terminal value} = \frac{\text{FCF}_{t+1}}{\text{WACC}}$$

Where:

FCF_{t+1} = free cash flow for the year after the end of the explicit forecast period

WACC = Weighted Average Cost of Capital

4.4.4 Cash Flow-Based Approach – Assuming Growth

An alternative approach is to assume that the free cash flow will grow at a constant rate to infinity, ie, the same as the Gordon growth model for dividends. In this case, the appropriate formula for arriving at the terminal value is as follows:

$$\text{Terminal value} = \frac{\text{ACF}_{t+1}}{\text{WACC} - g}$$

Where:

ACF_{t+1} = adjusted cash flow at Time t+1

g = expected growth rate in cash flows

It is important to note that the adjusted cash flow above is not as high as the free cash flow in the original formula with no growth. The reason for this is that the growth will only be achieved if some reinvestment takes place. It is not possible to create additional cash flows out of thin air. Even if there is inflation giving rise to increases in nominal cash flows, this implies that the money value of the company's asset base will have to increase. This will do so as the cost of replacing fixed assets increases and the level of debtors increases in line with inflation.

In practice, terminal value can often account for more than half of a company's DCF valuation, which makes the model particularly sensitive to assumptions about long-term growth and discount rates.

4.4.5 Should Growth be Incorporated?

It is important to recognise that the two approaches above will only come to a different answer if the expected return on new investment is different from the required return of investors. This can be illustrated by a simple example.

Exercise 6.7

Marlon plc, an ungeared company, has free cash flow available of £1,000, at Time 0, ie, now. The company is currently paying out all of its annual free cash flow as a dividend to shareholders. The free cash flow is expected to remain constant at £1,000 pa to infinity. The shareholders' required rate of return is 10%. Calculate the value of the company today on the basis that Marlon plc decides to:

- Maintain its current policy of paying out all of its free cash flow as a dividend.
- Retain 40% of its cash flow each year, starting now, and reinvest this to earn a return of 20%, ie, in excess of shareholders' required returns.
- Retain 40% of its cash flow each year but only earn a return on this of 5%, ie, below shareholders' required returns.
- Retain 40% of its cash flow each year and earn a return on this of 10%, ie, equal to shareholders' required returns.

Solution

a. $\text{Market value} = (1,000/0.1) + 1,000 = \text{£}11,000$

Note that the additional £1,000 needs to be added on to reflect the dividend flow at Time 0.

b. $\text{Growth rate in dividends} = rb = 0.20 \times 0.4 = 8\%$

$\text{Market value} = [(600 \times 1.08)/(0.1 - 0.08)] + 600 = \text{£}33,000$

The value of the dividend at Time 1 is given by the revised dividend of £600 today increased by the growth rate of 8%.

c. $\text{Growth rate in dividends} = rb = 0.05 \times 0.4 = 2\%$

$\text{Market value} = [(600 \times 1.02)/(0.1 - 0.02)] + 600 = \text{£}8,250$

d. $\text{Growth rate in dividends} = rb = 0.1 \times 0.4 = 4\%$

$\text{Market value} = [(600 \times 1.04)/(0.1 - 0.04)] + 600 = \text{£}11,000$

The above calculations indicate a conclusion that is not surprising. When a company's new investments earn a rate of return greater than that required by shareholders, the investments have a positive net present value and undertaking the investments increases shareholder wealth. When the new investments earn a sub-standard rate of return, they have a negative net present value (NPV) and reduce shareholder wealth. When the required rate of return equals the expected return, the new investments have a NPV of nil and shareholders are indifferent as to whether or not the investment is made.

Price-to-Earnings Ratios

The P/E approach is a fairly rough and ready measure and is more closely linked to the idea that the company is going to be sold at the end of the explicit forecasting period. The analyst will need to identify the expected net operating profits after tax for the last year of the forecast period and apply an appropriate P/E ratio to these profits.

If this approach gives a significantly different valuation to the cash-based approach, the reasons for this will need to be analysed carefully. For example, it may be that the cash-based approach is using a different discount rate than that used by the market to value companies in the sector in general. If this is the case, then the discount rate being used for the cash-based valuation will need to be studied very carefully to ensure that it is appropriate.

Conclusion on the Explicit Forecast Period

It was stated above that the explicit forecast period should extend over the period during which a company earns supernormal returns on its investments, ie, where it is able to achieve a return in excess of that demanded by shareholders. During this period, the level of reinvestment should be relatively high to capitalise on the growth opportunities available. At the end of the period, reinvestment levels will fall, reflecting the lack of profitable new investment opportunities arising.

Given that the explicit forecast period does extend this far, the easiest assumption to make for the terminal value is that cash flows will continue without growth to perpetuity. There is no point in retaining profits for reinvestment and any new investment will have a net present value of nil.

If the explicit forecast period does not extend this far, there are various problems in identifying the terminal value. Some elements of real growth will need to be incorporated, but it will clearly not continue forever – the period when the company has a competitive advantage is finite. In such a case, it may be appropriate to break down the terminal value into two components: the period when supernormal returns are expected; and the period from when expected returns fall to the investors' required returns.

4.6 Discounting the Cash Flows and Terminal Value

4.6.1 Long-Term Changes in Gearing Levels

It may be the case that a company is planning to change its gearing ratio in the medium to long term or that a potential acquirer is planning to alter the level of gearing. What are the implications of this for estimating the company's WACC and calculating a value for the business?

In theory, a separate WACC could be calculated for each period (say, each year), reflecting the spot rate for flows occurring in that year and the expected level of gearing in that year. The present value of each year's flows could then be calculated based on the WACC for that particular year. The problem with this is that it is fairly involved, and it is likely that a simpler approach will give a satisfactory answer.

If the company is planning to change its target level of gearing, then it is possible that this proposed change is already known to investors and the current cost of debt and equity will reflect the anticipated changes. This means that the WACC calculation can be based upon the existing cost of debt and equity for the company.

If an acquirer is planning to change the company's level of gearing, then it should first of all calculate the market value of the company using its existing level of gearing as a basis for the WACC, on the basis that investors are not aware that any change in gearing is going to take place. It should then recalculate the value of the company based upon a WACC assuming the revised level of gearing. The difference between the two values indicates the potential increase in value due to the improved gearing level. If this gearing level can only come about as a result of the acquisition, then it represents one of the potential synergies arising from the acquisition.

In this case, care should be taken that the costs of both debt and equity reflect the new level of gearing, rather than being based on historic gearing levels.

4.6.2 Short-Term Fluctuations

It may be the case that a company has fluctuating levels of debt through the year, especially if it is involved in a seasonal business. This means that the ratio of debt to equity will vary and the implications of this for estimating WACC should be considered.

As with longer term movements in debt levels, it would theoretically be possible to disaggregate each year into smaller periods and ascribe a WACC for each period based on the relevant spot rates and gearing levels. This would give rise to a very refined calculation but one with a spurious level of accuracy.

An easier approach is to estimate the weighted average level of debt for the year and use this as the basis for the debt to equity ratio in the WACC calculation. This approach has the advantage of reflecting the fact that the interest paid to investors over the year will also reflect the average level of debt outstanding over the year. Hence, the use of the weighted average level of debt will take account of the overall interest cost of servicing debt over the year.

The costs of debt and equity for the company in these circumstances should already reflect any risk implicit in the fluctuating gearing levels.

4.6.3 Enterprise Value and Equity Value

The usual approach to discounting future cash flows is to use the Weighted Average Cost of Capital (WACC). The WACC is a discount rate that reflects the overall risk of the company and is applied to the cash flows of company before any interest has been paid out.

This means that the resultant value is the total value of the company's equity and its debt. In order to estimate the value of the company's equity, the value of the debt will need to be deducted from the total value (enterprise value).

Exercise 6.8

You wish to establish the equity value of a company. You have prepared the following free cash flow forecasts for the business and consider it reasonable that the company grows at 1% per annum in the terminal period.

	£000
Year 1	400
Year 2	520
Year 3	595
Year 4	630
Year 5	690

The company is financed by 30% debt and 70% equity and has a published beta factor of 0.9.

Additional information

Tax is 30%.

The long-dated government bond yield is 4.7% and the yield on the company's own bonds is 6.9%.

The equity risk premium is 4%. The market value of the company's debt is £2 million.

Requirement

Calculate the enterprise value and equity value.

Solution**Calculating the Discount Rate**

Cost of equity, using CAPM:

$$\begin{aligned}
 K_e &= R_f + (\text{beta} \times \text{equity risk premium}) \\
 &= 4.7 + (0.9 \times 4) &= 8.3\%
 \end{aligned}$$

Cost of debt, net of tax:

$$K_d = 6.9 \times 0.7 = 4.8\%$$

Weighted average cost of capital

$$\text{WACC} = (70\% \times 8.3\%) + (30\% \times 4.8\%) = 7.3\%$$

Calculating the Primary Value

Time	Cash Flow (£000)	Discount Factor @ 7.3%	Present Value (£000)
1	400	0.932	373
2	520	0.869	452
3	595	0.809	481
4	630	0.754	475
5	690	0.703	485

Total primary value for the business is = £2,266,000

Calculating

Calculating the Terminal Value (All workings shown in thousands £000)

$$\begin{aligned}
 \text{TV (undiscounted)} &= \text{CF} \times \frac{(1 + g)}{(r - g)} \\
 &= 690 \times \frac{(1.01)}{0.063} = 11,062
 \end{aligned}$$

$$\text{TV (discounted)} = 11,062 \times 0.703 = 7777$$

Calculating enterprise value

$$\begin{aligned}
 \text{EV} &= \text{Forecast period value} + \text{Terminal value} \\
 &= 2,266 + 7,777 = 10,043
 \end{aligned}$$

Calculating equity value

$$\text{Equity value} = \text{Enterprise value} - \text{market value of debt} = 10,043 - 2,000 = 8,043$$

4.6.4 Use of Free Cash Flow to Equity (FCFE) in Valuation

The calculations so far have focussed on discounting free cash flow to the firm (FCFF) at the company's WACC to give an overall enterprise value. As seen in the above example, equity value can then be arrived at after deducting the market value of debt from the enterprise value.

There is, however, an alternative and more direct way of calculating the value of equity by discounting FCFE at the cost of equity. If we assume that FCFE is growing at a constant rate (g), the following formula can be used:

$$\text{Equity Value} = \frac{\text{FCFE}_0 (1+g)}{\text{Cost of equity} - g}$$

FCFF provides a valuation perspective that considers both equity and debt holders; hence cash flows are discounted at the company's WACC. FCFE, however, focuses specifically on the company's shareholders, ie, the providers of equity capital. Ultimately, the choice between FCFF and FCFE depends on the valuation context and the information needed by investors or analysts.

Exercise 6.9

The following information relates to Company ABC plc:

Net income	£50 million
Depreciation	£10 million
Capex	£20 million
Net borrowing	£5 million
Cash balance at the start of the year	£15 million
Cash balance at the end of the year	£25 million
Cost of equity	10%

Requirement

Calculate the company's FCFE and the equity value assuming growth of 2%.

Solution

FCFE = Net income + Depreciation – Capex + Net borrowing

= £50 + £10 – £20 + £5 = £45 million

$$\text{Total equity value} = \frac{\text{FCFE}_0 (1+g)}{\text{Cost of equity} - g} = \frac{£45\text{m} (1.02)}{0.1 - 0.02} = £573.75 \text{ million}$$

End of Chapter Questions

Think of an answer for each question and refer to the appropriate section for confirmation.

1. **In what situations is the asset-based valuation approach particularly useful, and what are some scenarios in which this method can be applied?**

Answer reference: Section 1.2

2. **Explain the limitations of asset-based valuation and discuss why it might not be suitable for certain companies.**

Answer reference: Section 1.2

3. **What is the fundamental principle behind dividend-based valuation and what information is needed in calculating a company's share price using the method?**

Answer reference: Section 2

4. **How does earnings-based valuation differ from intrinsic value calculations?**

Answer reference: Section 3.1

5. **Explain what enterprise value represents, how it is calculated and what components are included in this calculation.**

Answer reference: Section 3.3

6. **What are the main advantages of using an enterprise-based methodology when valuing a company?**

Answer reference: Section 3.3.1

7. **Explain how the use of an EBIT multiple for company valuation is different from using a P/E multiple.**

Answer reference: Section 3.4

8. **What are the advantages of using EBITDA multiples over traditional earnings multiples like P/E ratio?**

Answer reference: Section 3.5

9. **When forecasting a company's free cash flows using historical analysis, why is it important to analyse a period of five to ten years, and what are the potential challenges associated with selecting a shorter or longer time frame for analysis?**

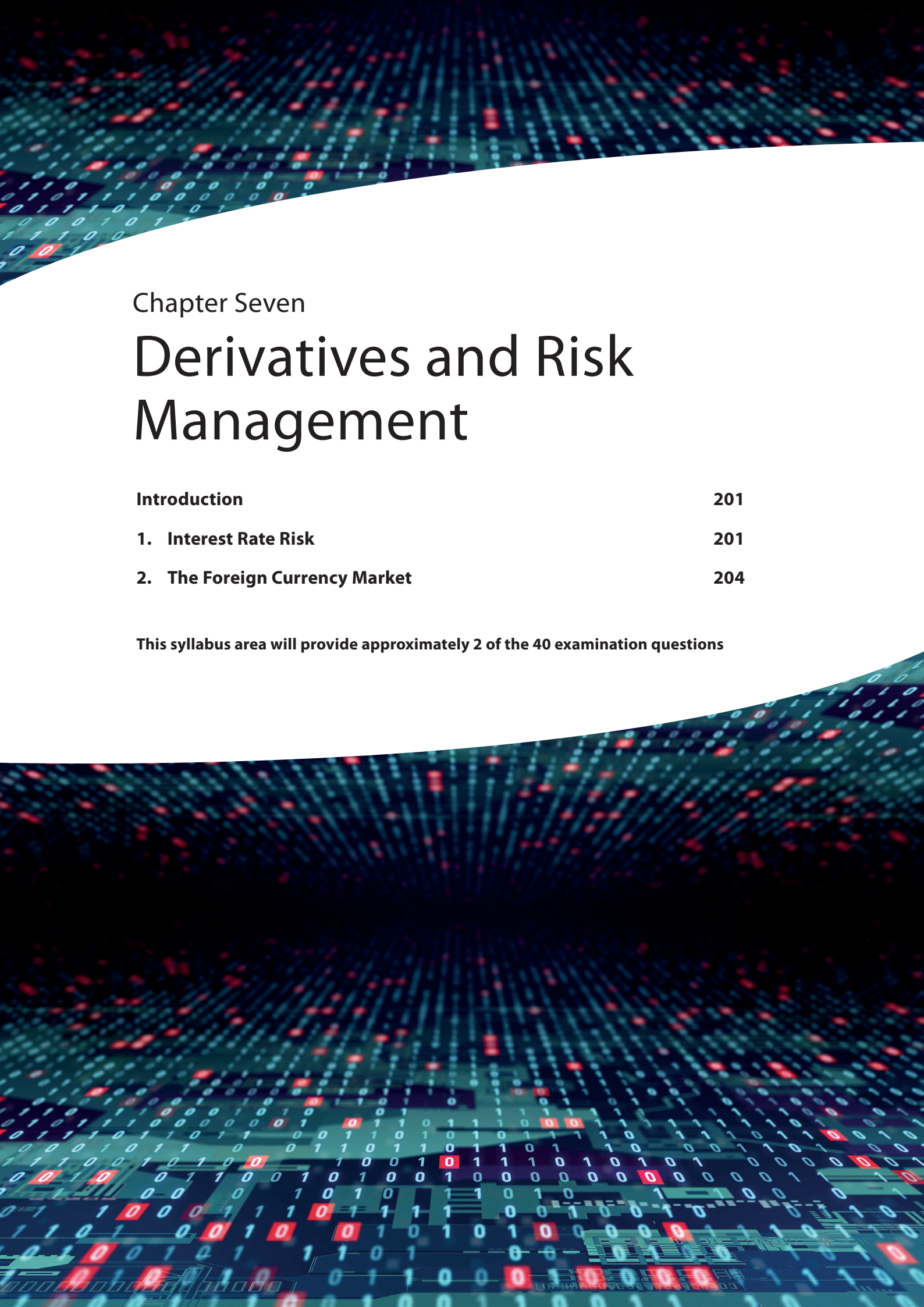
Answer reference: Section 4.3.1

10. **Why is it crucial to place the results of a historical analysis in context by doing an industry and competitor analysis?**

Answer reference: Sections 4.3.1

11. **Explain the two main elements used in the valuation of a company, namely the explicit forecasting period and the terminal value.**

Answer reference: Section 4.3.2



Chapter Seven

Derivatives and Risk Management

Introduction	201
1. Interest Rate Risk	201
2. The Foreign Currency Market	204

This syllabus area will provide approximately 2 of the 40 examination questions



Introduction

In finance, the ability to manage uncertainty and market fluctuations is central to long-term success. Derivatives, financial instruments whose value is linked to an underlying asset, index or rate, are now integral to corporate risk management.

Companies use derivatives to hedge against two of the most common exposures: changes in interest rates and movements in foreign exchange rates. In addition, equity derivatives can provide protection against wider market volatility, even for investors with diversified portfolios.

Effective hedging strategies are designed to stabilise cash flows and preserve enterprise value by reducing the impact of adverse market movements. To achieve this, firms make use of a range of derivative instruments, including forwards, futures, options and swaps. These tools allow businesses to manage financial risk systematically within an increasingly complex and interconnected global economy.

1. Interest Rate Risk

Learning Objectives

- 7.1.1 Understand interest rate risk
- 7.1.2 Understand foreign exchange risk

A company faces interest rate risk on both its floating rate and fixed rate borrowings. Floating rate debt exposes a company to the risk of underlying variability in the interest charges it faces on its borrowings. As market interest rates increase or decrease, the floating rate on the company's borrowings will also rise or fall, tracking the movement in the underlying rate. Choosing fixed rate debt removes this variability risk; however, a company can end up paying a higher fixed rate than prevailing market rates. Fixed rate debt thus leaves a company open to changes in the fair value of its

debt capital, as market rates change in relation to the fixed interest rate attached to the borrowings. A company thus faces interest rate risk on both fixed and floating rate debt. The exposure to interest rate risk is also relevant on M&A deals where debt finance is used but there's a time lapse between the deal analysis and deal closing.

1.1 Managing Interest Rate Risk

A company can seek to hedge the interest rate risk by using derivatives. The main hedging instruments that can be used are forward rate agreements, futures, swaps and options. Alternatively, where the magnitude of the risk is immaterial in comparison with the company's overall cash flows or appetite for risks, the company may decide to do nothing.

The company may also decide to do nothing if risk management costs are excessive, both in terms of the costs of using derivatives and the staff resources required to manage risk effectively. Appropriate products may not be available and of course the company may consider hedging unnecessary as it believes that the chances of an adverse movement are remote.

The different characteristics of the interest rate derivatives are detailed in the sections below, together with a consideration as to which instrument is likely to be most appropriate in a given scenario.

1.2 Foreign Currency Risk

Changes in underlying exchange rates gives rise to foreign currency risks. Generally, exposure to foreign currency risk can be categorised as transaction exposure, translation exposure and economic exposure.

1.2.1 Transaction Exposure

What is Transaction Risk?

Transaction risk is the risk of adverse exchange rate movements occurring in the course of normal international trading transactions. Transaction exposure occurs when a company has a future transaction that will be settled in a foreign currency. Such exposure could arise for example as the result of a UK company operating a foreign subsidiary. Operations in foreign countries encounter a variety of transactions for example, purchases or sales or financial transactions that are denominated in a foreign currency. Even when foreign subsidiaries operate independently of the parent company, without relying on the parent company as a source of cash, they will ultimately remit dividends to the parent in the foreign currency. Once again, this will require a conversion from foreign to home currency.

Hedging against Transaction Risk

Transactional risk gives rise to variability in cash flows which can be managed via foreign currency derivatives. Appropriate derivatives are forwards, futures, options and swaps. The use of these instruments is considered in the sections below.

1.2.2 Translation Exposure

What is Translation Risk?

Translation exposure occurs in multinational corporations that have foreign subsidiaries with assets and liabilities denominated in foreign currency. Translation exposure occurs because the value of these accounts must eventually be stated in domestic currency for reporting purposes in the company's financial statements. In general, as exchange rates change, the home currency value of the foreign subsidiaries' assets and liabilities will change. Such changes can result in translation losses or gains, which will be recognised in financial statements.

Hedging against Translation Risk

Translation gains/losses will not have an impact on the firm's cash flow unless the assets are sold. Translation risk is predominantly a presentational issue and as such the risks are best managed by 'natural hedges' such as matching assets and liabilities in the same currency.

1.2.3 Economic Exposure

What is Economic Risk?

Economic risk is the risk that exchange rate movements might reduce the international competitiveness of a company. It is the risk that the present value of a company's future cash flows might be reduced by adverse exchange rate movements. Economic exposure differs from transaction exposure in that exchange rate changes may affect the value of the firm even though the firm is not involved in foreign currency transactions. For example, if a company trades only in the UK but sterling strengthens significantly against other world currencies, it may find that it loses sales to an overseas competitor who can now afford to charge cheaper sterling prices.

Hedging against Economic Risk

Various actions can reduce economic exposure, including the following.

- **Matching assets and liabilities** – a foreign subsidiary can be financed, as far as possible, with a loan in the currency of the country in which the subsidiary operates.
- **Diversifying the supplier and customer base** – for example, if the currency of one of the supplier countries strengthens, purchasing can be switched to a cheaper source.
- **Diversifying operations worldwide** – on the principle that companies which confine themselves to one country suffer from economic exposure, international diversification is a method of reducing such exposure.
- **Changing prices** – the amount of scope a company has to change its prices in response to exchange movements will depend on its competitive position. If there are numerous domestic and overseas competitors, an increase in prices may lead to a significant fall in demand.

2. The Foreign Currency Market

Learning Objectives

- 7.2.1 Be able to analyse the use of the following in hedging interest rate and foreign currency risk: forward contracts; futures contracts; options; swaps

Before we look at foreign currency derivatives, we need to understand more about how the market in foreign currency operates.

2.1 Spot Transactions

The spot market is the forex market for immediate currency trades. These trades will settle in two business days. This will exclude public holidays in the countries of the two parties to the trade and also in the country of the currency. For example, a German bank dealing in the sterling market with an American bank would have to take into account public holidays in Germany, the US and the UK.

The market has no formal marketplace and trading takes place over the telephone and electronically with prices being quoted on screen services. The spot market quotes bid offer prices in the form of a spread, normally based against the dollar. The main exception to this is £/\$ (known as cable) where the dollar is quoted against the pound.

£/\$ Spot Rate	
1.4275 – 1.4385	
The buyer's rate	The seller's rate
£1 will get \$1.4275	\$1.4385 will get £1

It may be useful to remember that the bank will always give the customer the worse of the two rates. When selling you dollars, they will only give you \$1.4275, instead of \$1.4385. When buying dollars from you, they will give you £1 for each \$1.4385 you give them, rather than \$1.4275.

2.2 Forward Transactions

The forward market is a market in currencies at an agreed date in the future. It enables you to agree a rate today (the forward rate) at which the currencies will be exchanged on the agreed future date. The benefit of this is certainty – although you do not need the foreign currency until three months' time, you can fix an exchange rate today.

Forward rates are quoted as premiums (pm) or discounts (dis) to the spot rate. It is possible for rates to be quoted at par where the spot and forward are the same.

Exercise 7.1

Spot 1.4275–1.4385

One-month forward 0.37–0.35c pm

Three-month forward 1.00–0.97c pm

What is the one-month forward rate?

Solution

It is important to remember that these rates are quoted in cents, whereas the spot rate is quoted in dollars.

To obtain the forward rate, the premium is subtracted from the spot rate or the discount is added.

Based on the above figures, the one-month forward rate is

Spot rate 1.4275–1.4385

Less premium 0.0037–0.0035

1.4238–1.4350

One important factor to remember about this market is that it in no way reflects an expectation of what the rate will be in three, six or nine months' time. It is simply a mathematical result of the difference in interest rates in the two countries. The currency that has the lower interest rates will be at a premium in the forward market.

Exercise 7.2

Sterling interest rates are 8% and US dollar interest rates are 5%. The spot rate is \$2 = £1. What will be the one-year forward rate?

Solution

Assume that we have £100, which is equivalent today to \$200, given a spot rate of 2:1.

	£	\$
Current values	100	200
Interest for one year at 8% for £/5% for \$	8	10
Values in one year's time	108	210

The one-year forward rate today will be 1.9444 (210/108). If this were not the case, it would be possible to generate an arbitrage profit in the markets.

2.3 Interest Rate Parity Formula

As an alternative to the involved calculation above, it is possible to use the interest rate parity formula, as follows.

$$\text{Forward rate} = \frac{1+r_{\$}}{1+r_{£}} \times \text{Spot rate}$$

In this case:

$$\text{Forward rate} = \frac{1.05}{1.08} \times 2$$

$$\text{Forward rate} = 1.9444$$

2.4 The Impact of Inflation and Interest Rates on Exchange Rates

2.4.1 Interest Rates

The impact of interest rates on forward rates has been seen above. If the forward rate is assumed to be a good, unbiased indicator of the change in spot rates over time, then it can be stated that low interest rates will indicate that a currency is strengthening against currencies with higher interest rates. This can be justified by arguing that weakening currencies will need to offer high interest rates to remain competitive. This is observable in practice, as soft currencies usually offer high returns. The high interest rates are compensating for foreign exchange losses on the capital value for the investor.

2.4.2 Purchasing Power Parity (PPP)

Purchasing power parity argues that currencies suffering high inflation will tend to devalue to maintain relative purchasing power across currencies. For example, if the sterling/dollar exchange rate is 1.5:1, then £100 or \$150 can theoretically purchase the same basket of goods. If the UK suffers inflation at 10%, then in one year's time, the same basket of goods will cost £110. If the US has no inflation, the basket will still cost \$150. Purchasing power parity argues that the exchange rate will become [1.36 \(150/110\)](#).

In practice, PPP tends to hold only in the long run, as short-run exchange rates are heavily influenced by factors such as capital flows, speculation and monetary policy.

2.5 Use of Derivatives to Hedge Interest Rate and Foreign Currency Risk

2.5.1 Interest Rate Swaps

In their simplest form, interest rate swaps enable a company to raise funds on a fixed basis and subsequently convert the interest basis to a floating rate. Alternatively, a payment stream that is originally on a floating rate basis may be converted to a fixed rate stream.

The benefits of interest rate swaps include the following.

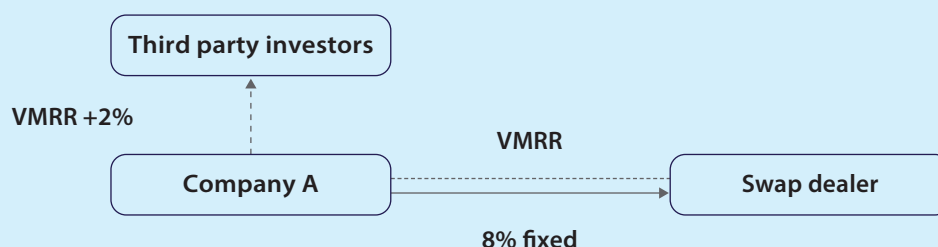
- The ability to exploit pricing inefficiencies between different marketplaces to end up with a lower overall cost of funds. For example, a company borrowing on a fixed rate basis may usually have to pay 10%. By borrowing floating rate and swapping into fixed rate, it may achieve a cost of less than 10%. The reason for this is that the fixed rate marketplace is overpricing the company's debt compared to the floating rate market place and a swap enables the company to exploit this inefficiency.
- The ability to restructure the company's payment profile from fixed to floating or vice versa. A company may wish to do this as a result of its view on the future direction of interest rates, for example.

Example

Company A may have borrowed £5m on a floating rate basis in the past, paying a variable market reference rate (VMRR) + 2% on an annual basis. The maturity of the debt is five years. It now wishes to convert this to a fixed rate basis. It achieves this by taking out a five-year interest rate swap based on a notional principal of £5m. The swap is based on the company paying a fixed rate amount of $8\% \times £5m$ to the swap dealer and receiving the $VMRR \times £5m$ from the dealer. Under the swap, the company either pays or receives the difference between these two payment streams.

The cash flows can be represented diagrammatically as follows.

Interest Rate Swap



In net terms, company A is now paying 10% fixed, since the VMRR element has cancelled out. For example, assuming that the VMRR is 9%, the company will pay its third-party investors 11% and receive from the swap dealer the difference between the VMRR and 8%, ie, 1%. The net cost is therefore 10%.

2.5.2 Advantages of Interest Rate Swaps

- **Flexibility and costs** – swaps are flexible, since they can be arranged in any size, and they can be reversed if necessary. Transaction costs are low, particularly if no intermediary is used, and are potentially much lower than the costs of terminating one loan and taking out another.
- **Credit ratings** – companies with different credit ratings can borrow in the market that offers each the best deal and then swap this benefit to reduce the mutual borrowing costs.
- **Capital structure** – swaps allow capital restructuring by changing the nature of interest commitments without renegotiating with lenders.

- **Risk management** – swaps can be used to manage interest rate risk by swapping floating for fixed rate debt if rates are expected to rise. Swaps can also be used to swap a variable rate for a fixed rate investment if interest rates are expected to fall.
- **Convenience** – swaps are relatively easy to arrange.
- **Predictability of cash flows** – if a company's future cash flows are uncertain, it can use a swap to ensure it has predictable fixed rate commitments.

2.5.2 Disadvantages of Interest Rate Swaps

- **Additional risk** – the swap is subject to counterparty risk; the risk that the other party will default leaving the first company to bear its obligations. This risk can be avoided by using an intermediary.
- **Movements in interest rates** – if a company takes on a floating rate commitment, it may be vulnerable to adverse movements in interest rates. If it takes on a fixed rate commitment, it won't be able to take advantage of favourable movements in rates.
- **Lack of liquidity** – the lack of a secondary market in swaps makes it very difficult to liquidate a swap contract.

2.6 Currency Swaps

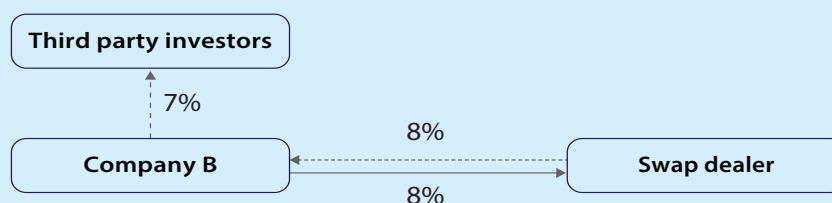
In their simplest form, currency swaps enable a company to raise funds in one currency and to convert these funds into another currency. The rationale for such swaps is similar in principle to interest rate swaps, ie, exploiting market inefficiencies and enabling the company to restructure the currency profile of its debt.

Example

Company B raises \$10m with a maturity of four years from third party investors, paying a fixed cost of 7%. It swaps this into sterling for four years, receiving £6.5m in exchange for the \$10m (based on an exchange rate of 1.538). Over the four years, Company B receives 7% x \$10m and pays 8% x £6.5m in interest. In four years' time, the swap is reversed. Company B pays the swap dealer £6.5m and receives \$10m. It then uses this \$10m to repay the third-party investors.

Effectively, Company B has raised sterling funds for four years, paying a fixed rate of interest of 8%. The transaction can be viewed diagrammatically as follows.

Currency Swap



In this case, all interest payments were fixed rate flows. It is also possible to have cross currency interest rate swaps, where one of the payments is fixed and the other is floating.

2.6.1 Advantages of Currency Swaps

- **Flexibility** – swaps are easy to arrange and are flexible since they can be arranged in any size and are reversible.
- **Cost** – transaction costs are low, only amounting to legal fees and arrangement fees, since there is no commission or premium to be paid.
- **Market avoidance** – the parties can obtain the currency they require without subjecting themselves to the uncertainties of the foreign exchange markets.
- **Access to finance** – the company can gain access to debt finance in another country and currency where it is little known, and consequently has a poorer credit rating, than in its home country. It can therefore take advantage of lower interest rates than it could obtain if it arranged the currency loan itself.
- **Financial restructuring** – currency swaps may be used to restructure the currency base of the company's liabilities. This may be important where the company is trading overseas and receiving revenues in foreign currencies, but its borrowings are denominated in the currency of its home country. Currency swaps therefore provide a means of reducing exchange rate exposure.
- **Conversion of debt type** – at the same time as exchanging currency, the company may also be able to convert fixed rate debt to floating rate or vice versa. Thus, it may obtain some of the benefits of an interest rate swap in addition to achieving the other purposes of a currency swap.
- **Liquidity improvement** – a currency swap could be used to absorb excess liquidity in one currency which is not needed immediately, to create funds in another where there is a need.

2.6.2 Disadvantages of Currency Swaps

- **Risk of default by the other party to the swap (counterparty risk)** – if one party became unable to meet its swap payment obligations, this could mean that the other party risked having to make them itself.
- **Position or market risk** – a company whose main business lies outside the field of finance should not increase financial risk in order to make speculative gains.
- **Sovereign risk** – there may be a risk of political disturbances or exchange controls in the country whose currency is being used for a swap.
- **Arrangement fees** – swaps have arrangement fees payable to third parties. Although these may appear to be cheap, this is because the intermediary accepts no liability for the swap. (The third party does however suffer some spread risk, as they warehouse one side of the swap until it is matched with the other, and then undertake a temporary hedge on the futures market.)

2.7 Forward Rate Agreements (FRA)

Interest rate swaps are usually appropriate for longer term interest rate exposures and are often used for maturities of between two and five years, possibly going out even further. Forward rate agreements (FRAs) are usually appropriate for shorter term hedging strategies. They enable a company to fix its interest cost for a particular payment period.

A forward rate agreement (FRA) does not involve the actual transfer of capital from one party to another. An FRA is an agreement to borrow/lend a notional amount for up to 12 months at an agreed rate of interest (the FRA rate). The 'notional' sum is the amount on which the interest payment is calculated. Only the interest on the notional amount between the rate dealt (that is the rate when the FRA is traded) and the rate prevailing at the time of settlement (the reference rate) actually changes hands.

If there is a rise in interest rates between the time that the FRA is traded and the date that the FRA comes into effect, the borrower is protected from paying the higher interest rate. If interest rates fall during that time, the borrower must pay the difference between the traded rate and the actual rate on the notional sum.

If a borrower wishes to hedge against an increase in interest rates to cover a three-month loan starting in three months' time, this is known as a 3 × 6 FRA. A three-month loan starting in one month's time would be a 1 × 4 FRA etc.

Example

A company has borrowings of £5m, with interest payable quarterly, at a rate of the variable market reference rate (VMRR) + 2%. It is concerned that in three months' time interest rates will rise, increasing its interest cost for the period from three months' time to six months' time. Accordingly, it buys a 3 × 6 FRA with a notional principal of £5m at an interest rate of 8%. This effectively locks it into a rate of 8%, giving an overall cost of 10% (VMRR + 2%).

In three months' time, the VMRR is 10%. On its borrowings, the company now has an interest cost of £5m × 3% (12% × $\frac{3}{12}$). Under the FRA, it receives a payment from the FRA dealer equivalent to £5m × 0.5% ($\{10\% - 8\% \} \times \frac{3}{12}$). Its net cost is therefore 2.5% for the three months, or 10% on an annual basis.

Note that the actual receipt under the FRA will usually take place at the beginning of the period to which it relates, whereas interest is usually paid in arrears. As a result, the payment under the FRA is actually the discounted value of the sum above, the discount rate being the appropriate market rate of interest. This can be seen as follows.

Difference under the FRA	= £5m × 0.5% = £25,000
Relevant discount rate	= 10% × $\frac{3}{12}$ = 2.5%
Actual payment made	= 25,000 × $\frac{1}{1.025}$ = £24,390

2.7.1 Advantages of FRAs

- **Protection provided** – an FRA would protect the borrower from adverse interest rate movements above the rate negotiated.
- **Flexibility** – FRAs are flexible; they can in theory be arranged for any amounts and any duration, although they are normally for amounts of over \$1 million.
- **Cost** – the cost of forward rate agreements is negligible.

2.7.2 Disadvantages of FRAs

- **Rate available** – the rate the bank will set for the forward rate agreement will reflect expectations of future interest rate movements. If interest rates are expected to rise, the bank may set a higher rate than the rate currently available.
- **Falling interest rate** – the borrower will not be able to take advantage if interest rates fall unexpectedly.
- **Term of FRA** – the FRA will terminate on a fixed date.
- **Binding agreement** – FRAs are binding agreements and are not easy to sell to other parties.

2.8 Foreign Currency Forward Contracts

A forward contract enables a company to agree an exchange rate today (the forward rate) for delivery of the currency at an agreed date in the future. This can be used by exporters and importers to fix the sterling value of overseas receipts and payments. It can also be used to fix the sterling value of dividend payments from overseas investments.

2.8.1 Problems with Forward Contracts

The advantage of a forward contract is that it locks into a fixed rate of exchange in the future. There are, however, a number of problems.

- Since the exchange rate is now fixed, the investor is protected against adverse rate movements, but cannot profit from favourable movements.
- The forward contract is for a fixed amount. If the amount of foreign currency received or paid is different to the amount specified in the forward contract, the difference will represent an outstanding exposure.
- It is necessary to estimate the expected future payment or receipt, which may not be easy.
- A series of flows, say dividends from overseas investments, would each need a separate forward contract, increasing costs and administration.
- If the underlying cash flow does not emerge, then the contract becomes an exposure in itself.

Exercise 7.4

Weft is an importer/exporter of textiles and textile machinery. It is based in the UK but trades extensively with countries throughout Europe, particularly in the eurozone. It has a small subsidiary based in Germany. The company is about to invoice a customer in Germany for 750,000 euros, payable in three months' time. Weft's treasurer is considering two methods of hedging the exchange risk. These are:

Method 1

Borrow €750,000 for three months, convert the loan into sterling and repay the loan out of eventual receipts.

Method 2

Enter into a three-month forward exchange contract with the company's bank to sell €750,000. The spot rate of exchange is £1 = €1.6006

The three-month forward rate of exchange is £1 = €1.5935

Annual interest rates for three months' borrowing and lending are: euro 3%, sterling 5%.

Required:

- Which of the two methods is the most financially advantageous for Weft?
- What are the other factors to consider before deciding whether to hedge the risk using the foreign currency markets?

Solution

Method 1

Weft borrows €750,000:

	Exporter	
	UK £	€
Now	2) Pay € loan into UK bank account $€744,417 / 1.6006 = £465,066$	1) Take out € loan $€750,000 / 1.0075 = €744.417$
	$5\% \times 3/12 = 1.25\%$ (ie, 1.0125)	$3\% \times 3/12 = 0.75\%$ (ie, 1.0075)
Three months	5) Sterling benefit $£465,066 \times 1.0125 = £470,900$	3) Receive € from export €750,000 4) Pay off € loan with export revenue (€750,000)

Using the money market hedge, Weft will receive £470,900.

Method 2

The exchange rate is fixed in advance at €1.5935 by a forward contract. Cash received in three months is converted to produce $€750,000/1.5935 = £470,662$.

Conclusion

- On the basis of the above calculations, Method 1 gives a slightly higher receipt. However, the difference is quite small, and banker's commission has been excluded from the calculation.
- Factors to consider before deciding whether to hedge foreign exchange risk using the foreign currency markets

Defensive Strategy

The company should have a clear strategy concerning how much foreign exchange risk it is prepared to bear. A highly risk-averse or 'defensive' strategy of hedging all transactions can be expensive in terms of commission costs, but recognises that exchange rates are unpredictable, can be volatile and so can cause severe losses unless the risk is hedged.

Predictive Strategy

An alternative 'predictive' strategy recognises that if all transaction exposures are hedged, the chance of making gains from favourable exchange rate movements is lost. It might be possible to predict the future movement in an exchange rate with some confidence. The company could therefore attempt to forecast foreign exchange movements and only hedge those transactions where losses from currency exposures are predicted. For example, if inflation is high in a particular country, its currency will probably depreciate, so that there is little to be gained by hedging future payments in that currency. However, future receipts in a weak currency would be hedged, to provide protection against the anticipated currency loss.

A predictive strategy can be a risky strategy. If exchange rate movements were certain, speculators would almost certainly force an immediate fall in the exchange rate. However, some corporate treasurers argue that, if predictions are made sensibly, a predictive strategy for hedging should lead to higher profits within acceptable risk limits than a risk-averse strategy of hedging everything. Fewer hedging transactions will also mean lower commission costs payable to the bank. The risk remains, though, that a single large, uncovered transaction could cause severe problems if the currency moves in the opposite direction to that predicted.

Maximum Limit

A sensible strategy for a company could be to set a maximum limit, in money terms, for a foreign currency exposure. Exposures above this amount should be hedged, but below this limit a predictive approach should be taken or, possibly, all amounts could be left unhedged.

Before using any technique to hedge foreign currency transactions, receipts and payments in the same currency at the same date should be offset. For example, if the company is expecting to receive €750,000 on 31 March and to pay €600,000 at about the same time, only the net receipt of €150,000 needs to be considered as a currency exposure.

Matching can be applied to receipts and payments which do not take place on exactly the same day by simply hedging the period and amount of the difference between the receipt and payment, or even by using a currency bank account. A company that has many receipts and payments in a single currency such as the euro should consider matching assets with liabilities in the same currency.

2.9 Foreign Currency Futures

Futures are standardised contracts that are traded on an organised exchange such as the Chicago Mercantile Exchange or ICE Futures Europe. They fix the exchange rate for a set amount of currency for a specified time period.

When entering into a foreign exchange futures contract, no one is actually buying or selling anything – the participants are agreeing to buy or sell currencies on pre-agreed terms at a specified future date if the contract is allowed to reach maturity, which it rarely does. Futures are a derivative (their value derives from movements in the spot rate).

Futures are generally more liquid and have less credit risk than forward contracts as organised exchanges have clearing houses that guarantee that all traders in the futures market will honour their obligations.

Futures contracts are assumed to mature at the end of either March, June, September or December. One of their limitations is that currencies can only be bought or sold on exchanges for US dollars.

A futures market hedge attempts to achieve the same result as a forward contract, that is to fix the exchange rate in advance for a future foreign currency payment or receipt. Forward contracts are agreed 'over the counter' between a bank and its customer. Futures contracts are standardised and traded on futures exchanges. This results in the following advantages and disadvantages.

2.9.1 Advantages of Currency Futures

- a. Transaction costs should be lower than for forward contracts.
- b. The exact date of receipt or payment of the currency does not have to be known, because the futures contract does not have to be closed out until the actual cash receipt or payment is made. In other words, the futures hedge gives the equivalent of an 'option forward' contract, limited only by the expiry date of the contract.
- c. Because future contracts are traded on exchange regulated markets, counterparty risk should be reduced and buying and selling contracts should be easy.

2.9.2 Disadvantages of Currency Futures

- a. The contracts cannot be tailored to the user's exact requirements.
- b. Hedge inefficiencies are caused by having to deal in a whole number of contracts and by basis risk.
- c. Only a limited number of currencies are the subject of futures contracts (although the number of currencies is growing, especially with the rapid development of Asian economies).
- d. The procedure for converting between two currencies neither of which is the US dollar is twice as complex for futures as for a forward contract.
- e. Using the market will involve various costs, including brokers' fees.
- f. Futures create a binding commitment to transact at maturity, unlike options which provide a right but not an obligation. Therefore futures offer less flexibility and may expose the user to greater downside risk.

In general, the disadvantages of futures mean that the market is much smaller than the currency forward market.

2.10 Interest Rate Futures

Interest rate futures are a similar method of hedging 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 bond bearing an 8% coupon in, say, six 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. 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.

2.11 Currency Options

A forward exchange contract is an agreement to buy or sell a given quantity of foreign exchange, which must be carried out because it is a binding contract. However, some exporters might be uncertain about the amount of currency they will earn in several months' time.

An alternative method of obtaining foreign exchange cover, which overcomes much of this problem, is the currency option. A currency option does not have to be exercised. Instead, when the date for exercising the option arrives, the importer or exporter can either exercise the option or let the option lapse.

The exercise price for the option may be the same as the current spot rate, or it may be more favourable or less favourable to the option holder than the current spot rate.

As with other types of option, buying a currency option involves paying a premium, which is the most the buyer of the option can lose. The level of option premiums depends on the following factors:

- the exercise price
- the maturity of the option
- the volatility of exchange and interest rates, and
- interest rate differentials, affecting how much banks charge.

Exercise 7.5

It is now 1 March. Robin Inc anticipates that it may receive €6m from the sale of a European investment in June. It wishes to hedge this potential receipt using options (in order to maximise receipt of dollars). The current spot rate is \$1 = €0.7106. June options with a value of €6m and an exercise price of €0.7200 can be purchased for a premium of \$150,000.

Required

What will the outcome of the hedge be in each of the following scenarios?

- The spot exchange rate in June is €0.6500.
- The spot exchange rate in June is €0.7500.
- The sale of the investment does not take place.

Solution

- a. The spot rate of 0.65 is better than the option rate of 0.72; therefore the spot rate is used. This will give a value of \$9,230,769 or \$9,080,769 after the premium (which is paid up front).
- b. The option rate of 0.72 is better than the spot rate of 0.75; therefore the option will be exercised. This will give a value of \$8,333,333 (or \$8,183,333 after the premium).
- c. If the sale of the investment is abandoned, then the option is no longer necessary. It will be abandoned (as in (a) above). The cost to the company of abandoning the option will be the premium of \$150,000.

2.11.1 Options in Practice

In corporate finance, we are concerned with hedgers who purchase options in order to reduce risk. So, given that we are normally going to purchase options, should we purchase puts or calls? Consider each of the following scenarios:

- **A US company receiving £ in the future** – the US company will wish to sell £ in the future and can therefore hedge by purchasing £ put options (ie, options to sell £).
- **A US company paying £ in the future** – the US company wishes to buy £ in the future and can therefore hedge by purchasing £ call options (ie, options to buy £).
- **A UK company receiving \$ in the future** – the UK company wishes to sell \$ in the future and cannot hedge by purchasing \$ put options as they don't exist. The company therefore has to purchase £ call options.
- **A UK company paying \$ in the future** – the UK company wishes to buy \$ in the future and cannot hedge by purchasing \$ call options as they don't exist. The company therefore has to purchase £ put options.

2.12 Interest Rate Options

An interest rate option grants the buyer of the option 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 the 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 – and are more expensive – than FRAs.

Exchange traded options are also available. These have standardised amounts and standard periods.

2.12.1 Advantages of Interest Rate Options

- **Upside risk** – the company has the choice not to exercise the option and will, therefore, be able to take advantage of falling interest rates.
- **Over the counter options** – these are tailored to the specific needs of the company and are therefore more flexible than exchange traded options for a more exact hedge.
- **Exchange traded options are useful for uncertain transactions** – for example you may be unsure if a loan will actually be needed. If it becomes evident that the option is not required, it can be sold.

2.12.2 Disadvantages of Interest Rate Options

- **Premium** – the premium cost may be relatively expensive compared with the costs of other hedging instruments. It will be payable whatever the movement in interest rates and whether or not the option is exercised.
- **Collar** – if the company has a collar, this will limit its ability to take advantage of lower interest rates to the lower limit set by the cap.
- **Maturity** – the maturity of exchange traded options may be limited to one year.
- **Traded options** – if the company purchased exchange traded options, then the large, fixed amounts of the available contracts may not match the amount to be hedged. The large amounts of the contracts will also prohibit organisations with smaller amounts to be hedged from using them.

2.13 Equity Derivatives

We have already discussed risk in the context of shares in earlier chapters. Remember that risk is the variability in future returns as measured by the standard deviation (σ). What causes returns to vary? What risk is there in holding a share? As a reminder, we need to break risk into two components. The total risk of a security (σ^J) is made up of unsystematic risk (σ^U) and systematic risk (σ^S).

Unsystematic risk, or specific risk as it is also called, relates to risk factors specific to a particular company. These would be factors such as management, products, location. These factors will influence a company's returns to some extent. These specific risk factors can be eliminated by holding a diversified portfolio. This is a concept known as diversification that we do not need to discuss in any more detail here.

Having eliminated unsystematic (specific) risk of investments through holding a diversified portfolio, for example a portfolio of the FTSE 100 Index stocks, we are still left with the systematic risk of the shares in the portfolio. It is clear that if an investor holds the market portfolio, ie, FTSE 100 stocks, there is still variability in returns, as evidenced by the movement in the FTSE 100 Index from one day to the next. This variability, or risk, is a function of the market (rather than being a function of things specific to a particular company). It cannot be eliminated by diversification. It is this risk that is eliminated by equities hedging with a suitable derivative, such as the FTSE 100 Index future. What we are saying is that the risk or variability associated with the market (FTSE 100 Index) is eliminated by using a future based on the price movement, or variability, of that index.

In the UK, to achieve an equities hedge with index futures the fund manager will look to sell FTSE futures. If the equity market were to fall, the short futures position should generate profits to offset the loss on the equity position.

If we wish to hedge a portfolio that does not match the market, we need to consider the beta of the portfolio. The beta of a stock or portfolio is defined as the ratio of the expected change in the price of the stock/portfolio to changes in the market itself. It is obtained by regressing stock prices against the overall market over time. A beta of 1.2, for example suggests, at least historically, that the stock has moved at 1.2 times the rate of the market. By understanding and quantifying beta, fund managers can tailor index futures positions to align with the risk profile of their portfolios, ensuring that systematic risk is effectively managed through an appropriate hedging strategy.

End of Chapter Questions

Think of an answer for each question and refer to the appropriate section for confirmation.

1. **Explain the concept of interest rate risk for companies, both in terms of floating rate and fixed rate borrowings.**
Answer reference: Section 1
2. **Distinguish between the three types of foreign currency risk.**
Answer reference: Sections 1.2
3. **Explain the use of forward contracts in managing risk.**
Answer reference: Section 2.2
4. **Explain how interest rate swaps allow companies to manage their interest rate exposure?**
Answer reference: 2.5.1
5. **What are the main differences between forward contracts and futures contracts?**
Answer reference: Section 2.8 and 2.9
6. **What is a currency option, and how does it differ from a forward exchange contract?**
Answer reference: 2.11
7. **How can market risk be mitigated through the use of derivatives like the FTSE 100 Index future?**
Answer reference: Section 2.13
8. **What is meant by purchasing power parity?**
Answer reference: Sections 2.4.2
9. **What are the main advantages of interest rate swaps?**
Answer reference: Section 2.5.2
10. **Explain what is meant by a forward rate agreement?**
Answer reference: Section 2.7

Glossary

Amortisation

Reduction in value of an intangible asset over time; recognised as an expense in a company's accounts.

Asset

A resource controlled by the entity as a result of past events and from which future economic benefits are expected to flow to the entity.

Associate

An entity over which the investor has significant influence.

Balance Sheet

Also called the Statement of Financial Position, this is the statement of a company's assets and liabilities at a particular date.

Beta

A measure of market risk. Beta measures the degree to which the historical returns on an asset (security) change with changes in the market portfolio return. Beta is referred to as an index of the systematic risk, due to general market conditions that cannot be diversified away.

Bond

A debt security which may be traded in the secondary market, where the borrower (issuer) promises to repay the lender (investor) the principal amount plus any periodic interest charges over a specified period of time.

Book Value

In equity: the total shareholders' equity, as shown on the statement of financial position (balance sheet), as distinct from the market value. In assets: the value as shown in the statement of financial position, as distinct from the market value.

Capital

Represents the financial resources that a company uses to fund its operations and investments. It consists of two primary components: debt and equity.

Capital Asset Pricing Model (CAPM)

A theory that describes the relationship between risk and return of a security (ordinary share) and the overall market. The CAPM states that the expected return on a share is equal to the risk-free rate of return plus a market risk premium (calculated as the company's beta times the equity market premium). Used to calculate the cost of equity.

Capital Market

Segment of the financial market where investors, companies, and governments raise long-term funds through the issuance and trading of various financial instruments. These instruments are principally stocks and bonds.

Cash

Cash comprises cash on hand and demand deposits.

Cash Equivalents

Cash equivalents are short-term, highly-liquid investments that are readily convertible to known amounts of cash and which are subject to an insignificant risk of changes in value.

Cash Flows

Cash flows are inflows and outflows of cash and cash equivalents.

Clawed Back/Clawback

In an open offer with placing, shares are first placed provisionally with institutions and then offered to the issuer's existing shareholders. Any shares taken up by existing shareholders are then 'clawed back' from the institutions and issued instead to the shareholders.

Commercial Paper (CP)

Unsecured bearer securities issued by companies with high credit ratings. Commercial paper is a money market instrument with a maturity of up to 270 days. It does not pay coupons but provides a return to investors by being issued at a discount, and redeemed at par.

Contingent Convertible Bond

A bond which is converted mandatorily into equity of the issuer in specified circumstances, such as the breach of a lending covenant. Also referred to as a 'Coco'.

Control

Control is the exposure, or rights, to variable returns from an entity's involvement with its investee. The investor has the ability to affect those returns through its power over the investee.

Convertible Bond/Convertible Loan Stock

A bond that can be converted into a specified number of ordinary shares at the option of the bondholder.

Corporate Bond

A debt obligation issued by a corporation.

Correlation

The degree of co-movement between two variables, determined through regression analysis and quantified by the correlation coefficient. Correlation does not prove that a cause and effect or even a steady relationship exists between two variables, as correlations

can arise from pure chance or other underlying factors.

Coupon

The rate of interest payable to investors periodically over the life of a bond. Can be expressed in either percentage or currency amounts. Can be fixed or variable, ie, adjusted periodically by reference to a spread over a set benchmark.

Current Assets

Assets that are expected to be sold or consumed during the company's trading cycle. Includes inventory, trade receivables and cash.

Debt to Equity Ratio

Measure of a company's financial risk. Calculated by dividing total debt by total equity (shareholders' funds). Also referred to as a gearing ratio.

Debt Securities

Securities whereby the issuer acknowledges a loan made to it. The term includes instruments such as bonds, certificates of deposit (CDs) and commercial paper.

Default Risk

Also called credit risk. The risk that a borrower or bond issuer will be unable to meet future interest or principal payment obligations.

Depreciation

Reduction in the value of a tangible asset over time, due to wear and tear, obsolescence or depletion. Allocated over the life of the asset and recognised as an expense in a company's accounts.

Discount Rate

The rate used in discounting cash flows, to establish the present value of a sum of cash flows receivable in the future. Usually derived from an interest rate or cost of capital, such as WACC.

Discounted Cash Flow (DCF)

Valuation and investment appraisal methodology; calculates the present value of a series of cash flows receivable in the future, taking into account risk and time value of money. Obtained by discounting the sums by a known discount rate.

Diversification

The reduction of investment risk by investing in a wide variety of assets or asset classes. The underlying principle of diversification is based on the concept that different assets have varying degrees of risk and return characteristics. When assets are combined in a diversified portfolio, they may not all move in the same direction at the same time. Some assets may perform well when others underperform, leading to a potential offsetting effect and smoothing out overall portfolio returns.

Dividend Yield

Dividend per share divided by share price, expressed as a percentage. May be calculated either gross (before taxation) or net (after taxation).

Due Diligence

A detailed investigation into the history, current status and future prospects of a company in connection with a fundraising or acquisition.

Earnings per Share (EPS)

Net profit after tax and before ordinary dividends, divided by the weighted average number of shares outstanding during the period.

EBIT

Earnings before interest and tax. Also known as operating profit.

EBITDA

Earnings before interest, tax, depreciation and amortisation.

Enterprise Value (EV)

Value of all the operational assets of a company; equivalent to the total of its equity value plus its net debt, plus any other capital sources, such as preference share capital or non-controlling interests.

Equity

The residual interest in the assets of the entity after deducting all of its liabilities.

Equity Shares – Commercial Companies (ESCC)

The main FCA listing category (from 2024) for commercial companies seeking admission to the LSE's main market. Provides access to the broadest pool of investors and eligibility for index inclusion.

Equity Shares (Transition)

A temporary FCA listing category for companies previously admitted under the former premium segment, allowing them time to adapt to the new Equity Shares – Commercial Companies (ESCC) requirements introduced in 2024.

Equity Value

Total value of the equity of a company. Equivalent to its shareholders' funds. In a public company this is equal to its market capitalisation.

Expected Return

The return (gain or loss) on an investment that is anticipated, usually based on historical returns on assets of that kind, and taking risk and duration into account.

Fair Value

The price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date.

Family Office

The investment operation of a high net worth family.

Financial Conduct Authority (FCA)

The UK regulatory body that is responsible for regulating the conduct of financial services businesses and markets. It is responsible for the Listing Rules in the UK.

Floating Charge

In a bank loan, security over a specified class of current assets (such as trade receivables or inventory).

Founder Shares

A class of shares held by the founder of a company. Usually carry preferential rights compared with other classes of shares of the same company.

Free Cash Flow

Cash flow generated by the underlying business operations of a company. Generally shown before interest but after tax, capital expenditure and working capital investment.

Free Cash Flow to Equity (FCFE)

Free Cash Flow to Equity is a financial metric that represents the cash generated by a company's

operations that is available for distribution to its equity shareholders after covering operating expenses, capital expenditures, and debt-related payments.

Free Cash Flow to the Firm (FCFF)

Free Cash Flow to the Firm is a financial metric that represents the amount of cash a company generates from its operations that is available for distribution to all of its investors – both debt and equity holders – after covering operating expenses and capital expenditures.

Future

A futures contract is a legally binding arrangement by which parties commit to buy/sell a standard quantity and (if applicable) quality of an asset from/to another party on a specified date in the future, but at a price agreed today. Because the price is agreed at the outset, the seller is protected from a fall in the price of the underlying asset in the intervening time period (and vice versa).

Gearing

The ratio of debt to equity of a company. A useful indicator of financial stress. Also referred to as 'leverage'.

Gilts

Bonds issued by the UK Government.

Green Bond Principles (GBP)

Voluntary guidelines published by ICMA to promote transparency and integrity in the green bond market. They recommend disclosure and reporting on the use of proceeds, project evaluation, management of proceeds, and impact reporting.

IFRS S1 and S2

Issued by the International Sustainability Standards Board (ISSB) in 2023, requiring disclosure of sustainability-related risks (S1) and climate-related risks and opportunities (S2). These standards influence capital budgeting and valuation practices.

Income

Income represents increases in economic benefits during the accounting period, in the form of inflows or enhancements of assets or decreases of liabilities, that result in an increase in equity, other than those relating to contributions from equity participants.

Income Statement

The statement of a company's income and expenditure over a period. Also called the statement of profit and loss account.

Initial Public Offering (IPO)

The process by which a private company offers its shares to the public for the first time, thereby becoming a listed company.

Intangibles

Intangibles are identifiable non-monetary assets without physical substance.

Interest Cover

Measure of a company's financial risk. Calculated by dividing either EBIT or EBITDA by interest paid. Frequently used as a financial covenant in bank loans.

International Capital Market Association (ICMA)

A trade association representing capital market participants globally. ICMA develops guidelines and standards to support efficient, well-functioning markets, including voluntary principles for sustainable finance.

Internal Rate of Return (IRR)

A financial metric used to evaluate the potential profitability of an investment or project. The IRR represents the discount rate at which the net present value of all future cash flows from the investment becomes zero. In other words, it is the rate at which the present value of cash inflows equals the present value of cash outflows.

 K_d (Cost of Debt)

The after-tax cost of debt of a company; calculated as interest $\times$ (1-tax rate).

 K_e (Cost of Equity)

The cost of equity of a company, calculated using the CAPM formula or the dividend discount model.

Lease

A contract that conveys the right to use an asset for a period of time in exchange for a regular payment.

Leverage

Proportion of debt to equity in a company's balance sheet. Also referred to as gearing in the UK.

Liability

A present obligation of the entity arising from past events, the settlement of which is expected to result in an outflow from the entity of resources embodying economic benefits.

Liquidity

- A company's ability to meet its debts as they fall due, out of existing assets; two key measures are the quick ratio and the current ratio.
- The number of shares available to buy and sell in a market.

Listing Rules

Contained in the FCA Handbook, the Listing Rules provide rules for the London Stock Exchange (LSE) main market and other listed companies, including criteria for listing, processes, documentation and continuing obligations. The listing rules are based on principles which take into account the interests of listed entities, maintenance of investor protection and the need to protect the reputation of the market.

London Stock Exchange (LSE)

The dominant UK market for trading in securities, especially shares and bonds. The LSE is a recognised investment exchange (RIE).

Management Buy-in (MBI)

Acquisition of a company by an incoming management team, backed by private equity funding.

Management Buyout (MBO)

Acquisition of a company from a parent company by its own management, backed by private equity funding.

Market Capitalisation/Market Value

The total market value of a quoted company's equity. Calculated by multiplying the ordinary share price by the number of ordinary shares outstanding.

Maturity Date

The date on which the principal amount of a bond must be repaid.

Mezzanine Debt

Subordinated debt which is usually unsecured and provides a high return to the lender through a combination of a high coupon and equity warrants.

Minority Interest

The proportion of the profit/loss and assets/liabilities of a company's subsidiary not attributable to the company's own shareholders. Instead, this 'minority interest' is attributable to minority shareholders of that subsidiary. Also called non-controlling interest (NCI).

Net Asset Value

Financial metric used in various contexts to assess the value of assets after deducting liabilities. It serves as an indicator of the net worth or value of an entity, for example mutual funds, investment companies or companies.

Net Present Value (NPV)

A project's net monetary contribution to the value of a company, or an investment's net monetary contribution to the investor. Calculated by computing the present value of future cash flows less the initial investment.

New Issue

A new issue of ordinary shares whether made by an offer for sale, an offer for subscription or a placing.

Nominal Value

The face or par value of a security. The nominal value is the price at which a bond is usually redeemed, though it may be issued at a discount. For equities, it is the price below which a company's ordinary shares cannot be issued.

Normalised net working capital

An adjusted measure of working capital that excludes temporary or non-recurring fluctuations in receivables, payables, or inventory, to reflect the sustainable level required to support operations. Used in free cash flow and enterprise value calculations.

Open Offer

A secondary offering by a public company of new shares to its existing shareholders in proportion to their existing holdings; shareholders' entitlements are not renounceable. Often accompanied by a placing.

Operating Profit Margin or Operating Margin

The ratio derived by dividing operating profit by net turnover.

Operating Profit

Also known as EBIT. It represents trading profit plus/less income and expense from non-core business-related activities.

Option

An option gives the holder the right (but not the obligation) to buy or sell a fixed quantity of an underlying asset on, or before, a specified date in the future. There are two basic types of option – puts and calls. The holder of a call option has the right to buy the underlying asset at a given price. The holder of a put option has the right to sell the underlying asset at a given price.

Overdraft

Short-term debt facility available to a person or company by prior agreement with a bank, up to pre-agreed limits, often for working capital purposes. Repayable on demand and usually granted for a period of one year at a time.

Over-the-Counter (OTC)

Transactions between banks and their counterparties conducted away from recognised exchanges.

Parent

A parent in an entity that controls one or more other (subsidiary) entities.

Par Value

Also known as face value or nominal value. The value of a security shown on the certificate.

Pension Fund

A fund that is established for investment of pensions savings and the payment of retirement benefits. Pension funds are major investors in the worldwide capital markets.

Placing

Offer of shares in a company to new, usually institutional, shareholders. Can be used in a primary or a secondary fundraising.

Pre-emption Rights

Under the Companies Act 2006, shareholders in public companies must be provided with pre-emption rights, which are the right for existing shareholders to be offered, in preference to any new shareholders, any new shares issued for cash by a company. Effectively, this is a right of first refusal, designed to protect the interest of shareholders in their company.

Preference Shares

A class of equity that typically has limited voting rights, priority over ordinary shares, a fixed dividend rate and the right of conversion and/or redemption. Also known as preferred shares or preferred stock. Dividends on preference are typically cumulative.

Present Value

The value of a sum of money receivable at a known future date expressed in terms of its value today. A present value is obtained by discounting the future sum by a known discount rate.

Price Earnings Ratio (P/E Ratio)

The price per share of a company divided by its earnings per share. A measure used in company valuation.

Primary Market

The market for newly issued securities (bonds or shares).

Principal

Amount of debt that must be repaid and on which interest is based.

Private Equity

Provision of equity capital to private companies by professional investment firms, generally operating collective investment vehicles, with the view of achieving an exit of their investment in a period of three to five years a positive return (often in the region of 30%).

Prospectus

Document to be published when a company seeks to issue shares to the public, or seeks admission to listing for securities on a stock exchange.

Provisional Allotment Letter (PAL)

A document sent to those shareholders who have certificated holdings and are entitled to participate in a rights issue. The letter details the shareholder's existing shareholding, their rights over the new shares allotted and the date(s) by which they must act.

Recognised Investment Exchange (RIE)

A term used to denote those UK exchanges which operate markets in investments, meeting certain standards set by the Financial Conduct Authority (FCA).

Redemption

Borrower's payment of a debt instrument's face value to the investors at the debt instrument's maturity date.

Return on Capital Employed (ROCE)

Calculates the operating profit generated by the company as a percentage of the capital invested in it. Calculated as operating profit (EBIT) divided by total capital employed.

Revolving Credit Facility

Debt facility provided by a bank to a borrower, allowing it to draw down and repay at will over a specified period of time.

Rights Issue

Offer of new ordinary shares to existing shareholders, for cash, in proportion to their existing shareholding. Entitlement is renounceable.

Risk Premium

The additional return or compensation that investors demand for taking on higher levels of risk compared to the risk-free rate.

Running Yield

The return from a bond calculated by expressing the coupon as a percentage of the bond's price. Also known as the flat yield or interest yield. It ignores any profit or loss on redemption.

Sale and Leaseback

Financing for a company where the company sells an asset to a finance house for a capital sum then leases the same asset back for regular lease payments.

Secondary Market

The market where securities are traded after having been issued in the primary market.

Trading of shares on a stock exchange is trading in the secondary market.

Share Buyback

Where a company purchases some of its own shares. These shares are then either cancelled or held as treasury stock. Buybacks may be carried out through on-market or off-exchange purchases.

Share Capital

In the statement of financial position, this is the nominal value of a company's equity or ordinary shares. A company's authorised share capital is the nominal value of equity the company may issue, while issued share capital is that which the company has issued. The term 'share capital' is often extended to include a company's preference shares.

Sovereign Wealth Funds (SWFs)

State-owned investment funds that manage and invest the assets of a country's government. These funds are typically established by countries that have significant reserves of foreign currency, trade surpluses, or revenues from natural resources such as oil and minerals.

Stabilisation

The activity of supporting the price of a new issue of securities or bonds in order to minimise the volatility that can sometimes arise with new issues.

Stagging

The sale of shares acquired in an IPO within a short period after listing. Also known as flipping.

Standard Deviation

A measure of dispersion of a set of data from their mean. Abbreviated to σ , and calculated as the square root of the variance.

Subsidiary

A subsidiary is an entity that is controlled by another entity.

Sustainability-Linked Bond Principles (SLBP)

Voluntary guidelines issued by ICMA for bonds where financial or structural characteristics vary depending on the issuer's achievement of predefined sustainability or ESG targets.

Term Loans

Corporate loans that have a specified term.

Transaction Value

Valuation achieved on a negotiated sale or purchase of a company.

UK Corporate Governance Code (2018)

A set of principles of good corporate governance providing a code of best practice aimed at companies admitted to the Equity Shares – Commercial Companies category on the London Stock Exchange (LSE). It is overseen by the Financial Reporting Council (FRC), and its importance derives from the FCA's Listing Rules, which require that listed companies disclose how they have complied with the code, and explain where they have not applied the code – in what the code refers to as comply or explain. The code adopts a principles-based approach in the sense that it provides general guidelines of best practice.

Underwriting

In a share offering – an agreement by the issuer's bank to buy any shares that remain unsold in the offering at a pre-agreed price.

Variability

The extent to which data points differ from each other. In finance, it is taken to indicate the degree to which returns could differ from expectations.

Variance

A measure of dispersion of a set of data from their mean. Abbreviated to σ^2 and calculated as the average of the squared deviations from the mean.

Venture Capital

Investment funds available for investment in smaller, younger companies that are perceived to have high growth prospects.

Volatility

A measure of the extent to which investment returns, asset prices and economic variables fluctuate. Volatility is measured by the standard deviation of these returns, prices and values.

Warrant

A transferable security giving the holder the right to buy a set number of the underlying equities at a predetermined price on specified dates, or at any time, up to the end of a predetermined time period. Warrants are usually issued by companies or by securities houses.

Weighted Average Cost of Capital (WACC)

Weighted average of a company's cost of debt and cost of equity. Calculated as $((K_d \times MV_d) + (K_e \times MV_e)) / (MV_d + MV_e)$. Used as a discount rate in evaluating the company's value or its investments.

Winding-up

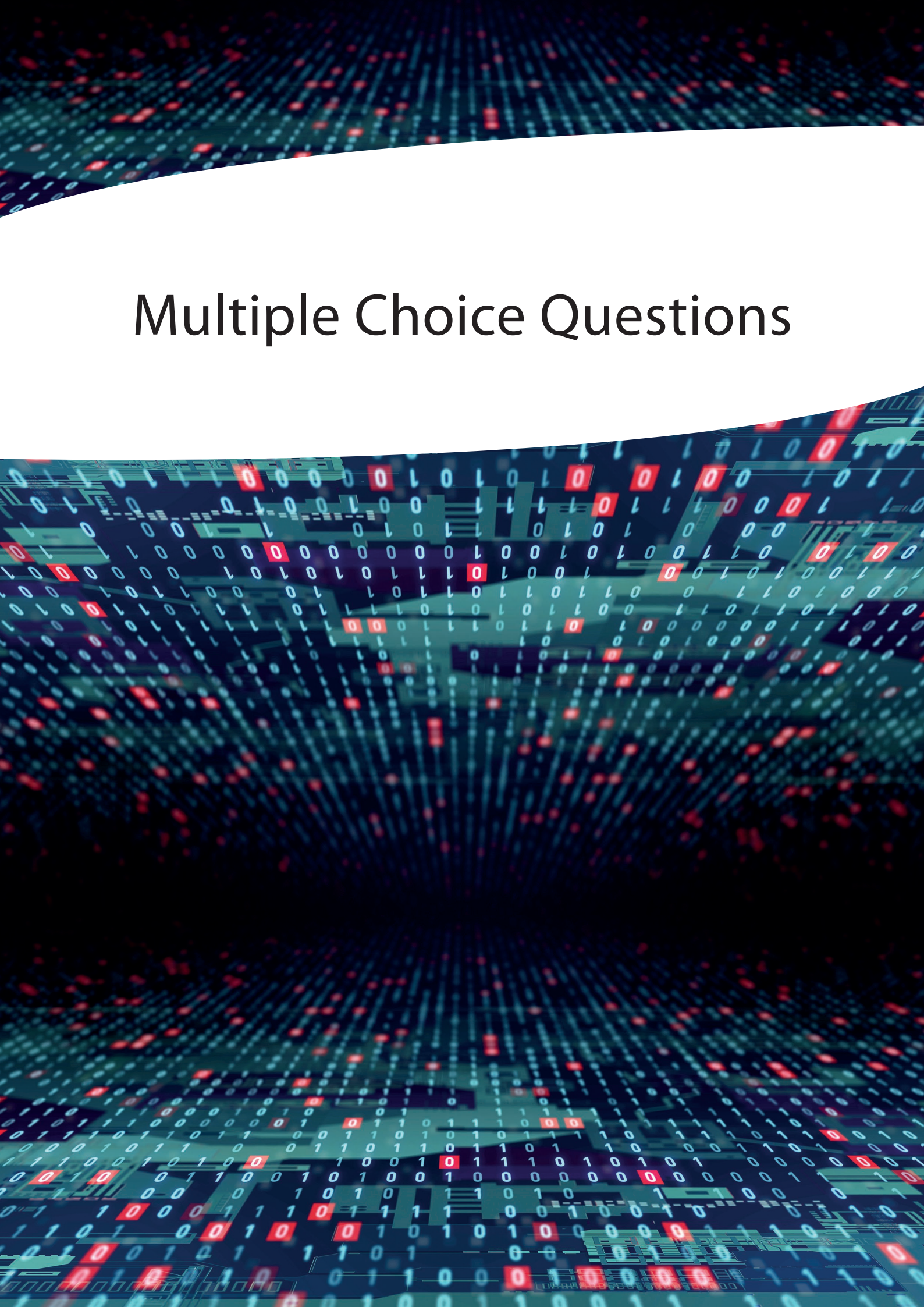
Termination of a company's existence through a legal process, either on an insolvency or otherwise. Requires liquidation of all assets, repayment of all liabilities, and payment of any surplus funds to shareholders.

Yield to Maturity (YTM)

The annual compound return from holding a bond to maturity, taking into account both interest payments and any capital gain or loss at maturity. Also known as the gross redemption yield (GRY).

Zero Coupon Bonds (ZCBs)

Bonds in which no periodic interest payments are made. The return is the difference between the discount at which the bond is issued, or traded during its life, and redemption at par.

The background of the slide is a complex, abstract digital pattern. It features a dark blue and black base with numerous glowing red and white binary digits (0s and 1s) scattered across it. Overlaid on this are faint, greenish-blue circuit-like lines and patterns that resemble a microchip or a data network. The overall effect is a sense of high-tech, digital connectivity.

Multiple Choice Questions

The following questions have been compiled to reflect as closely as possible the standard that you will experience in your examination. Please note, however, they are not actual exam questions.

1. Jane holds shares in two companies A and B. Both companies are based in the same sector and the same market. The risk free rate is 3% and the market return is currently 8%. However both companies have different levels of systematic risk and hence difference betas. Company A's Beta is 1.5 whereas Company B's Beta is 0.8. What would happen to the cost of equity of both companies if the market return moved to 10%?
 - A. Company A's cost of equity would increase whereas company B's cost of equity would decrease
 - B. Company B's cost of equity would increase whereas company A's cost of equity would decrease
 - C. Both companies cost of equity would increase
 - D. Both companies cost of equity would decrease

2. Raymond held a portfolio of bonds in four companies over a five-year period with details on each of the bond's returns over the period included below.

Company	A	B	C	D
Coupon Income	100	75	45	130
Capital Gains	24	0	75	-46
Reinvestment income	0	55	0	20
Total	124	130	120	104

Based on the information above which bond yields the highest return for Raymond?

- A. Company A
 - B. Company B
 - C. Company C
 - D. Company D

3. Caitlin holds a portfolio of shares in four different companies. In which of the following companies would adjusted present value (APV) be most useful as an investment appraisal method?
 - A. Company A which is entirely funded by ordinary share capital with no debt
 - B. Company B which is predominantly funded by retained profits
 - C. Company C which is predominantly funded by bank debt
 - D. Company D which is funded by non-coupon preference shares

4. A company issues a five-year bond with a 5% annual coupon and a par value of £100. Use the spot rates in the table below to determine which statement is correct (to two decimal places):

Year	Spot rate
1	4%
2	5%
3	6%
4	7%
5	8%

- A. The present value in year 1 is 3.81
 B. The present value in year 2 is 4.81
 C. The present value in year 3 is 4.20
 D. The present value in year 4 is 4.54
5. Which share class often determines the dividend payout for deferred shareholders?
- A. Founder shares
 B. Ordinary shares
 C. Preference shares
 D. A shares
6. Which basis of asset valuation reflects the actual price agreed between a buyer and a seller in a completed deal?
- A. Book value
 B. Earnings value
 C. Market value
 D. Transaction value
7. Sammy is holding a well-diversified portfolio consisting of world equities. He considers including shares of Company A, which has a beta of 0.5. Which of the following statements about the portfolio's risk is correct?
- A. Company A is less volatile than the market
 B. The systematic risk of Company A can be diversified away after the inclusion
 C. The systematic risk of his portfolio will increase after the inclusion
 D. The unsystematic risk of his portfolio will increase after the inclusion

8. **Modified duration has particular limitations in relation to:**

- A. Small changes in interest rates
- B. Large changes in interest rates
- C. Small changes in yield
- D. Large changes in yield

9. **Featherington limited has four different loans with summary details below:**

Loan	A	B	C	D
Interest Rate	Fixed	Floating	Floating	Fixed
Margin	1%	2.5%	1.5%	0.5%

Through which of these loans is Featherington Limited exposed to interest rate risk?

- A. A and D
 - B. B and C
 - C. D and C
 - D. A, B, C and D
10. **What benefit does debt factoring offer to a business?**
- A. Reduced interest rates on the outstanding debt
 - B. The ability to restructure payments on a monthly basis
 - C. Interest charges only on the outstanding debt
 - D. Immediate cash flow
11. **This table shows how a listed company performed over a four-year period. The company had 25 million shares in issue throughout this period.**

Year	1	2	3	4
Share price	1.25	1.36	1.52	1.25
Operating profit	100	112	120	130
Net debt	30	42	33	36
Depreciation	3.6	3.8	4.1	4.3

In what year was the company's EBIT multiple highest in relation to enterprise value.

- A. Year 1
- B. Year 2
- C. Year 3
- D. Year 4

12. Simon is considering investing in four different three-year projects. Which of these provides the highest return on investment?

Project	A	B	C	D
Total net Income over project	£100,000	£125,000	£150,000	£200,000
Capital required	£100,000	£100,000	£120,000	£175,000
Total Depreciation	£50,000	£85,000	£80,000	£120,000

- A. Project A
- B. Project B
- C. Project C
- D. Project D

13. This table shows financial data relating to four separate companies:

Company	1	2	3	4
Total assets	700,000	850,000	350,000	490,000
Tangible assets	420,000	510,000	210,000	294,000
Intangible assets	100,000	200,000	120,000	160,000
Liabilities	280,000	340,000	140,000	196,000

Using the asset-based approach, which company has the highest equity value?

- A. Company 1
- B. Company 2
- C. Company 3
- D. Company 4

14. James, a financial consultant, is evaluating financing options for a set of clients. In which of the following situations would a management buy-in be the most appropriate?

- A. A start-up venture seeking seed funding to develop and launch a new product in a competitive market. The business is currently management-owned and experiencing rapid growth
- B. A well-established company aiming to raise capital for expanding its production facilities and increasing market share
- C. A distressed company undergoing financial restructuring and seeking funding to avoid bankruptcy and implement a turnaround strategy
- D. A publicly traded corporation planning to finance a major acquisition to diversify its business portfolio and enter new markets

15. Which one of the following has the potential to generate inaccurate data based on its use of subjective estimates of financial distress?
- Adjusted present value
 - Internal rate of return
 - Net present value
 - Return on capital employed
16. For a public company, what is the maximum period for which shareholder authority to conduct an off-market share repurchase can be granted?
- 6 months
 - 12 months
 - 18 months
 - 24 months
17. An analyst is using matrix pricing to estimate the value of an illiquid bond. They have identified a set of comparable bonds and built a pricing matrix. However, the illiquid bond has a unique feature that none of the comparable bonds possess. How should the analyst proceed?
- Ignore the unique feature as it is not represented in the comparable bonds and therefore irrelevant to the matrix pricing method
 - Adjust the market discount rate to account for the unique feature of the illiquid bond
 - Proceed with the matrix pricing as usual, but adjust the estimated value to account for the unique feature of the illiquid bond
 - Abandon the matrix pricing method as it cannot accommodate unique features of bonds
18. Anita is assessing investment options across four companies. Based on the information in the table, which of the following companies has the lowest weighted average cost of capital?

Company	A	B	C	D
Turnover	£1,000,000	£1,000,000	£1,000,000	£1,000,000
Profit	£100,000	£100,000	£100,000	£100,000
Debt	£0	£50,000	£100,000	£450,000
Equity	£500,000	£450,000	£400,000	£50,000
Shareholders' funds	£500,000	£500,000	£500,000	£500,000

- Company A
- Company B
- Company C
- Company D

19. Stradbroke plc has redeemable debt in issue with a nominal value of £1 million, which has a market value of £940,000. The corporation tax rate is 25%. The debt is redeemable at par in four years and pays a coupon of 7% a year. Tax relief is received in the same year as the interest payments are made. The internal rate of return (that is the return to debt investors) is 8.75%. What is the after-tax cost of debt for the company?
- A. 5.25%
- B. 6.56%
- C. 7%
- D. 8.25%
20. Analyse the data in the table below and determine which of the four companies generates the highest free cash flow to the enterprise based on a 30% tax rate.

Company	1	2	3	4
EBIT	80	64	100	70
Depreciation	32	25.6	36	25.2
Accounting tax charge	6	4.8	8	5.6
Capital Expenditure	24	19.2	28	19.6
Capital allowances available in year	32	25.6	42	29.4
Increase in working capital p.a.	2.5	2.75	2	1.75

- A. Company 1
- B. Company 2
- C. Company 3
- D. Company 4
21. Use the dividend growth model to determine which of the four companies in the table below has the lowest cost of equity.

Company	1	2	3	4
Share price	40	45	44	47
Current dividend	5	7	6	8
Expected growth rate	6%	4%	5%	3%

- A. Company 1
- B. Company 2
- C. Company 3
- D. Company 4

22. Benelf Ltd is a property development company which owns a shopping centre site. The shopping centre is at full capacity and trading well. At the beginning of the year, Benelf Limited acquired an adjacent greenfield site. The company has submitted a planning application to develop the site into a leisure facility and is confident that planning consent will be granted within the year.

During the year there is an unexpected and severe property crash and recession. A number of retailers in the shopping centre go into liquidation. Benelf Ltd is facing cash flow pressures as a result and in order to continue to service debt it must sell the adjacent site up to generate cash.

Based on the information which one of the following statements is true:

- A. Prior to the property crash Benelf Ltd had an 'option to invest' the greenfield site but now it has an 'option to delay'
 - B. Benelf Ltd currently has both the 'option to delay' and the 'option to withdraw' for the greenfield site
 - C. Prior to the property crash Benelf Ltd had an 'option to expand' the greenfield site
 - D. Prior to the property cash Benelf Ltd did not have an 'option to expand' the greenfield site as suitable conditions were not in place
23. A depository receipt may represent a fraction of a share of the original company. This is because:
- A. it makes arbitrage harder to achieve
 - B. lower priced depository receipts are always more attractive to investors
 - C. it reduces the effect of exchange rate fluctuations
 - D. the number issued and their price is determined by a specific ratio
24. Use the dividend-based valuation approach to determine which of the companies in this table has the highest equity value:

Company	1	2	3	4
Dividend	800,000	400,000	600,000	700,000
Predicted growth	8%	6%	7%	9%
Required rate of return	12%	10%	9%	11%
Shares in issue	1,000,000	1,200,000	1,100,000	1,000,000

- A. Company 1
- B. Company 2
- C. Company 3
- D. Company 4

25. A bond is currently priced at £104, has a modified duration of 4.36 and convexity of 12.85. What would be the new price of the bond (to two decimal places) assuming interest rates increase by 1%?
- £99.53
 - £99.60
 - £106.15
 - £108.60
26. Katie Company plans to add a production line by acquiring a new machine costing £150,000. The investment is expected to increase sales revenue by £120,000 per year and fixed costs by £40,000 per year. The contribution margin will remain at 60%. At the end of the three-year period the machine will be disposed of at £100,000. The cost of equity is 15%. The three-year annuity factor at 15% is 2.2832. Which of the following statements related to the new production line is correct?
- The present value of additional sales revenue is £164,391
 - The present value of additional contribution margin is £47,341
 - The Company should invest and the net present value is £138,813
 - The Company should not invest as the net present value is negative
27. Alex is the Chief Executive Officer of XYZ Ltd, a fast-growing start-up based in London with an estimated market capitalisation of £5 billion. He wants to list is considering taking his company on the London Stock Exchange but is unsure of the best listing option. His company complies with the UK Corporate Governance Code. Alex should:
- seek admission to the Equity Shares Commercial Companies category provided his company meets the minimum eligibility criteria as this will give XYZ Ltd access to the largest pool of investors
 - seek admission to the Equity Shares Transition category and later apply for a main listing once it can meet the relevant criteria
 - be aware that AIM requires enhanced financial reporting such as half-yearly financial reports and compliance with IFRS
 - seek admission to AIM as this provides the highest level of transparency and therefore ensures greater investor confidence
28. Gordon is interested in purchasing a new ski chalet that will be ready in 12 months' time but will have to sell his current holiday home in France to be able to afford the purchase. At present sterling interest rates are 5.5% and the Euro interest rate is 4.5%. The current spot rate is €1.17:£1.
- What will be the one year forward rate?
- 1.1812
 - 1.1517
 - 1.1589
 - 1.1722

29. Analyse the data in the table below to determine which company has the highest cost of equity according to the capital asset pricing model:

Company	1	2	3	4
Share price	385	275	420	195
Beta	1.4	1.3	1.2	1.1
Risk free rate	4%	4%	4%	4%
Market risk premium	8%	8%	8%	8%

- A. Company 1
 B. Company 2
 C. Company 3
 D. Company 4
30. Amanda is the accountant for a UK-wide florist which is considering investing in a new fleet of delivery vans. She is assessing the rates of return associated with the investment. Amanda has undertaken some research on the project as follows:

Discount Rate	NPV
8%	£8,000
10%	-£1,000

Based on the information, what is the IRR associated with the project?

- A. 10.25%
 B. 9.78%
 C. 10.29%
 D. 10.57%
31. If an investor has purchased debt in one company that allows the opportunity to gain equity exposure to another company, it is likely that they are holding:
- A. a convertible bond
 B. an exchangeable bond
 C. a eurobond
 D. a transition bond

32. Havery Ltd is a company which is in the process of being sold. Havery Ltd's finance director is attempting to use the asset-based valuation model to assign a value to the company with the following information:

Asset	Book Value
Property	£250,000
Goodwill	£100,000
Other assets	£350,000
Liabilities	£280,000

The finance director understands that the property has increased in value by 10% since it was purchased which has not yet been reflected in the book value. In addition, the company will crystallise an additional contingent obligation of £150,000 upon sale.

Applying the asset-based valuation model, Havery Ltd's value is:

- A. £195,000
 - B. £295,000
 - C. £345,000
 - D. £445,000
33. XYZ Company is a listed company on the London Stock Exchange. The chief financial controller is considering raising capital by placing. Which of the following justifications is most appropriate?
- A. Leverage the relationship with stockbrokers
 - B. Increase trading liquidity of the company's shares
 - C. Introduce strategic institutional investors
 - D. List on another overseas exchange
34. NCHA Ltd is planning to issue new shares. The existing shareholders will have pre-emption rights. However, the company is considering disapplying these rights. Under which of the following circumstances would this be most justified?
- A. The company wants to raise capital quickly and believes that offering shares to the public would be faster
 - B. The company wants to bring in a new strategic investor who can provide not only capital but also industry expertise and connections
 - C. The company wants to prevent the dilution of ownership by limiting the number of shares each existing shareholder can buy
 - D. The company wants to reward its employees by offering them the new shares

35. Company A has in issue some irredeemable debt with the following key information:

Nominal value	£200
Coupon	10%
Market price	£180
Market price at issue	£190
Corporation tax	20%

What is the Company A's cost of debt before and after tax (to the nearest decimal point)?

- A. 11.1% and 8.9% respectively
 - B. 8.9% and 11.1% respectively
 - C. 10.5% and 8.4% respectively
 - D. 8.4% and 11.1% respectively
36. Which financial metric is useful for valuing businesses where a change of control is expected?
- A. Market capitalisation
 - B. Price earnings ratio
 - C. Equity value
 - D. Enterprise value
37. Judy is considering buying either one of the following European put options for short-term investment:

	Option 1	Option 2	Option 3
Exercise price	£40	£30	£20
Time to expiry	6 months	3 months	4 months

Which of the following statements is correct?

- A. Option 1 has higher value than Option 2
- B. Option 2 has the highest value
- C. Option 3 has higher value than Option 1
- D. Option 3 has the highest value

38. This table shows how a publicly traded company's funding structure changed over a 4-year period:

Year	1	2	3	4
Market value of Equity	7,000,000	7,500,000	8,300,000	8,000,000
Market value of Debt	3,000,000	3,200,000	3,400,000	3,300,000
Cost of equity	7.00%	6.75%	8.50%	8.00%
Cost of debt (after tax)	4.75%	5.00%	5.75%	6.00%

Which year saw the company's highest weighted average cost of capital?

- A. Year 1
- B. Year 2
- C. Year 3
- D. Year 4

39. This table shows the net present value (NPV) generated by four bonds that have three years to maturity:

NPV	Bond 1	Bond 2	Bond 3	Bond 4
Year 1	7.56	6.58	3.82	4.49
Year 2	6.13	5.47	4.92	4.07
Year 3	5.71	4.88	4.13	3.98
Year 4	83.65	79.38	82.86	81.53

Which bond has the lowest Macaulay duration?

- A. Bond 1
- B. Bond 2
- C. Bond 3
- D. Bond4

40. The financial controller of ABC Company has the following financial data:

	£
Net income	100,000
Depreciation	20,000
Capital expenditure	28,000
Working capital at the beginning of year	30,000
Working capital at the end of year	26,000
Net debt payment	15,000

The after-tax cost of debt is 5% with 20% corporate tax. The cost of equity is 15%. The company will maintain the fixed debt-equity ratio of 1:1 in the foreseeable future. Calculate the equity value if the company will experience an infinite 4% growth rate on free cash flow to equity.

- A. £349,818
- B. £713,333
- C. £1,011,636
- D. £1,541,091

Answers to Multiple Choice Questions

1. C Chapter 4, Section 1.4.2

Using the CAPM equation you can see as the market return increases, the cost of equity will also increase.

2. B Chapter 2, Section 3.2

For an investor, the returns from a bond come from the following sources:

1. Income from coupon/interest payments.
2. Gain/loss on redemption, ie, capital gains or losses that may occur if the bond is bought or sold at a price different from its face value.
3. Reinvestment income. When bondholders receive coupon payments, they can reinvest these funds in other investments

	A	B	C	D
Coupon Income	100	75	45	130
Capital Gains	24	0	75	-46
Reinvestment income	0	55	0	20
Total	124	130	120	104

3. C Chapter 5, Section 1.6

Adjusted Present Value (APV) is a financial valuation method used to assess the value of a business, project or investment by considering both the present value of its cash flows and the impact of financing decisions. APV is particularly useful when evaluating projects or businesses with complex capital structures, varying levels of debt, or when there are significant tax shields involved.

4. C Chapter 2, Section 3.3

The present value in year 3 is 4.20 as shown in the table below.

Year	Cashflow	Discount Factor	Present Value
1	5	0.961538	4.807692
2	5	0.907029	4.535147
3	5	0.839619	4.198096
4	5	0.762895	3.814476

5. B Chapter 1, Section 1.2.3

The term 'deferred' share refers to a type of share in which the typical rights of the shareholder are postponed or deferred in some manner. Usually, deferred shares come with limited dividend entitlements and do not qualify for dividends until a specific condition is met, which is typically one of the following:

- When the ordinary dividends have reached a predetermined threshold.
- After a specific period has elapsed since their issuance.

6. D Chapter 6, Section 1

Transaction value refers to the actual price or consideration agreed upon in a specific transaction. This is the value that the buyer and seller have negotiated and are willing to exchange for the assets or the entire business.

7. A Chapter 4, Section 1.3.1

Option A is correct as beta is less than 1.

- A. Company A is less volatile than the market. (As beta is less than 1)
- B. The systematic risk of Company A can be diversified away after the inclusion. (Cannot diversify)
- C. The systematic risk of his portfolio will increase after the inclusion. (As Company A's beta is less than the portfolio, ie, 1, the systematic risk will be reduced after the inclusion)
- D. The unsystematic risk of his portfolio will increase after the inclusion. (The inclusion will not affect unsystematic risk due to diversification effect)

A beta greater than 1 suggests the asset is more volatile than the market. For example, a beta of 1.5 indicates that the asset's returns tend to move 1.5 times as much, in either direction, as the market's returns. It's considered more risk-sensitive.

A beta less than 1 implies the asset is less volatile than the market. A beta of 0.8 indicates that the asset's returns typically move only 80% as much as the market's returns. It's considered less risk-sensitive.

8. B Chapter 2, Section 5.2.2

Modified duration provides a useful approximation for small changes in interest rates. It has limitations, however, when dealing with large interest rate movements.

9. D Chapter 7, Section 1

A company faces interest rate risk on both its floating rate and fixed rate borrowings. Floating rate debt exposes a company to the risk of underlying variability in the interest charges it faces on its borrowings.

10. D Chapter 2, Section 1.3

Debt factoring involves selling accounts receivable (unpaid invoices) to a factoring company at a discount. The factoring company collects the outstanding payments from customers. This provides immediate cash flow as the company receives a portion of the invoice amount upfront from the factoring company. Factoring companies charge fees and take a percentage of the invoice amount as compensation.

11. B Chapter 6, Section 3.4

B is correct as the EBIT multiple equates to 0.678571.

Solution:

	Year 1	Year 2	Year 3	Year 4
Share price	1.25	1.36	1.52	1.25
Shares in issue	25	25	25	25
Equity value	31.25	34	38	31.25
Operating profit	100	112	120	130
Net debt	30	42	33	36
Enterprise value	61.25	76	71	67.25
Depreciation	3.6	3.8	4.1	4.3
EBIT (= OP PROFIT)	100	112	120	130
EBITDA (=Op Prof + Deprec)	103.6	115.8	124.1	134.3
EBIT multiple	0.6125	0.678571	0.591667	0.517308

12. C Chapter 5, Section 1.2

The highest return on investments is Project C which has an ROCE of 0.194. This is calculated as follows:

Total net income – Total depreciation = Total profit before interest payable

$$150,000 - 80,000 = 70,000$$

$$\text{Average annual profit} = \frac{70,000}{3} = 23,333.33$$

$$\text{ROCE} = \frac{23,333.33}{120,000} = 0.194$$

Project	Average Annual Profit	ROCE	ROCE (%)
A	16666.66667	0.166667	16.66667
B	13333.33333	0.133333	13.33333
C	23333.33333	0.194444	19.44444
D	26666.66667	0.152381	15.2381

13. B Chapter 6, Section 1.1

Company C's has the highest equity value, totalling 370,000. This is calculated as follows:

Net Asset Value (NAV) = Total Assets – Total Liabilities

$$\text{NAV} = 510,000 + 200,000 - 340,000 = 370,000$$

	Company 1	Company 2	Company 3	Company 4
Total assets	700,000	850,000	350,000	490,000
Tangible assets	420,000	510,000	210,000	294,000
Intangible assets	100,000	200,000	120,000	160,000
Liabilities	280,000	340,000	140,000	196,000
Equity value	240,000	370,000	190,000	258,000

14. C Chapter 3, Section 2.4

Management Buy-In (MBI) – in an MBI, external individuals or a group of investors acquire a company, bringing in a new management team to run the business. The buyers in an MBI are external to the company and often consist of entrepreneurs, investors or other professionals with the expertise and vision to lead the acquired business. MBIs are often pursued when a company needs new leadership to drive a turnaround, capitalise on untapped potential or bring about a change in strategic direction.

15. A Chapter 5, Section 1.6.3

It relies on various assumptions, such as the estimation of financial distress costs and subsidies, which can introduce subjectivity.

16. C Chapter 1, Section 3.7

For an off-market purchase, the terms of the contract of purchase must be approved by special resolution prior to the purchase taking place. For a public company, the authority to make the repurchase must expire within 18 months of the resolution being passed.

17. C Chapter 2, Section 3.4

Build a pricing matrix – using the data on the comparable bonds, create a matrix that shows the relationship between various bond characteristics (eg, time to maturity, credit rating) and their corresponding yields or prices. This matrix is often constructed through statistical analysis, and it allows you to estimate how changes in these characteristics affect bond prices or yields.

18. D Chapter 4, Section 4

Increased gearing affects the WACC in two conflicting ways. It tends to be reduced due to the lower cost of debt finance but pulled up by the increasing cost of equity.

19. B Chapter 4, Section 2.2

The after-tax cost of debt for Stradbroke plc is 6.56%.

20. C Chapter 6, Section 4

Company 3 generates the highest free cash flow to the enterprise with 77.80.

EBIT	80	64	100.00	70
Depreciation	32	25.6	36.00	25.2
Accounting tax charge	6	4.8	8.00	5.6
Tax rate	0.3	0.03	0.30	0.3
Capital expenditure	24	19.2	28.00	19.6
Capital allowances available in year	32	25.6	42.00	29.4
Increase in working capital pa	2.5	2.75	2.00	1.75
Cash EBIT	112.00	89.60	136.00	95.20
– Tax (30% x cash EBIT)	33.6	26.88	40.8	28.56
plus Capital allowances relief	9.6	7.68	12.6	8.82
minus capex	24.00	19.20	28.00	19.60
Minus Increase in working capital	2.50	2.75	2.00	1.75
Free cash flow to the enterprise	61.50	48.45	77.80	54.11

21. A Chapter 4, Section 1.1

Company 1 has the lowest cost of equity at 19.25%.

Company	1	2	3	4
Current dividend	5	7	6	8
Expected growth rate	6%	4%	5%	3%
Share price	40.00	45	44	47
Expected div	5.30	7.28	6.30	8.24
K_e	19.25%	20.18%	19.32%	20.53%

22. D Chapter 5, Section 2.2.1

The option to expand, also known as the growth option, represents the opportunity to invest additional capital in a project or business if certain favourable conditions or opportunities arise. Imagine a manufacturing company that has built a new production facility. It may have the option to expand the facility's capacity in the future if market demand for its products increases. This allows the company to scale up production when necessary.

The option to expand is primarily akin to a call option because it gives the firm the right (but not the obligation) to invest additional capital in a project if certain favourable conditions materialise. It resembles a call option to buy more of the underlying asset.

When evaluating an investment with an option to expand, the firm considers the initial cost of the project and the potential future investment required for expansion. The value of the real option to expand increases as the likelihood of needing to expand, and the expected benefits of expansion, rise.

23. D Chapter 1, Section 1.5.1

The number of these DRs issued and their individual prices are determined by a specific ratio, indicating how many depository receipts correspond to the underlying shares. Consequently, a single DR may represent a whole share of the original company, multiple shares or even a fraction of a shares of the original company. The price of each depository receipt is influenced by various factors that also impact the price of the underlying shares, such as the financial health of the company, prevailing market conditions and fluctuations in exchange rates

24. D Chapter 6, Section 2.2

Company 4 has the highest equity value, totalling 38.15. The following formula can be used:

$$P_0 = \frac{D_0(1+g)}{K_e - g}$$

$$P_0 = \frac{700,000 (1 + 0.09)}{(0.11 - 0.09)} = 38,150,000$$

The value of equity in total is £38,150,000. If there are 1 million shares outstanding, the value of each share would therefore be £38.15.

Company	1	2	3	4
Dividend	800,000	400,000	600,000	700,000
Predicted growth	8%	6%	7%	9%
Required rate of return	12%	10%	9%	11%
Top line	864,000	424,000	642,000	763,000
Bottom line	0.04	0.04	0.02	0.02
Equity value	21,600,000	10,600,000	32,100,000	38,150,000
Shares in issue	1,000,000	1,200,000	1,100,000	1,000,000
EV	21.6	8.833333333	29.18181818	38.15

25. A Chapter 2, Section 5.3

Option A is correct, using the following equation:

$$£104 \times (1 + (-4.36 \times 0.01) + (0.5 \times 12.85 \times 0.01^2))$$

26. D Chapter 5, Section 3.1

Option D is correct.

The discount factor is calculated by using the cost of equity. Discount Factor = $1/(1+r)^3$. The denominator is raised to the third power as the terminal value will be collected at the end of the third year.

Discount factor $1/((1+0.15)^3) = 0.6575$.

	Discount factor	PV (£)
Contribution (120,000 x 60%)	2.2832	164,391
Fixed costs 40,000	2.2832	(91,328)
Terminal value 100,000	0.6575	65,750
Initial cost		(150,000)
Change of NPV		(-11,187)

The NPV is negative so the company should not invest.

27. A Chapter 1, Section 2.3

Under the new UK listing rules introduced by the FCA, the Equity Shares (Commercial Companies) category is the primary category for new listings. It replaces the previous premium and standard segments. The Equity Shares (Transition) category is reserved for companies already admitted under the old premium listing rules and is not available to new applicants. AIM remains a separate growth market for smaller companies, with lighter reporting and governance requirements than the main market. Importantly, companies in the Commercial Companies category are expected to apply the UK Corporate Governance Code on a “comply or explain” basis, which is appropriate for a large, established issuer such as XYZ Ltd.

28. C Chapter 7, Section 2.2

The one-year forward rate is 1.1589 and is calculated as follows:

$$1.17 \times 1.045 = 1.22265$$

$$1 \times 1.055 = 1.055$$

$$1.22265/1.055 = 1.1589$$

29. A Chapter 4, Section 1

Company 1 has the highest cost of equity according to the capital asset pricing model. The highest cost of equity is 0.152 and is calculated as follows:

Cost of equity or expected return = risk-free rate + Beta (Market risk premium)

$$0.04 + 1.4 (0.08) = 0.152$$

Company	1	2	3	4
Share price	385	275	420	195
Risk free rate	0.04	0.04	0.04	0.04
Beta	1.4	1.3	1.2	1.1
Market risk premium	0.08	0.08	0.08	0.08
Cost equity	0.152	0.144	0.136	0.128

30. B Chapter 5, Section 1.4

Amanda evaluates the investment project with the following NPVs at different discount rates:

- At a 8% discount rate, the NPV is £8,000.
- At a 10% discount rate, the NPV is –£1,000.

The approximate IRR for this investment using interpolation is:

$$\text{IRR} = 8\% + \frac{8,000}{8,000+1,000} \times 2\% = 9.78\%$$

31. B Chapter 2, Section 2.1.8

Exchangeable bonds allow bondholders to exchange their bonds for shares of a different company, often a subsidiary or a related entity of the issuer. Investors have the flexibility to benefit from potential share price appreciation in the designated company

32. A Chapter 6, Section 1.1

Havery Ltd's value is £195,000 and is calculated as follows:

= (Property x increase in 10%) + other assets – Liabilities – Contingent Obligation

= (250,000 x 1.1) + 350,000 – 280,000 – 150,000 = 195,000

Goodwill is not included in the calculation.

33. C Chapter 1, Section 2.6.3

One of the main advantages of a placing for the company is:

- **Targeting of investors** – the placing gives the company the opportunity to target an appropriate investor base and to select its shareholders more carefully.

34. B Chapter 1, Section 3.6.1

Pre-emption rights are a right enshrined in UK statute. The arguments for their existence are rooted in the following principles:

- Existing shareholders have the right to decide what happens to their ownership of a company, not the directors.
- Issue of shares to new investors will be at a discount to market price, to encourage them to subscribe. This means that shares will be sold on the cheap, resulting in a transfer of value from old to new shareholders.

35. A Chapter 4, Section 2.4

When adjustments are made for tax, the cost of debt decreases, ie, the after-tax cost of debt is lower than the before-tax cost of debt. This is because of the fact that interest on debt is a tax deductible expense, ie, interest payments are deducted before a company pays tax.

From the table of data and the following calculations option A is correct:

$$\text{Coupon} = 10\% \times 200 = 20$$

$$K_{id} \text{ (Before tax) coupon/market price} = 20/180 = 11.1\%$$

$$K_{id} \text{ after tax} = 11.1\% \times (1-0.2) = 8.9\%$$

36. D Chapter 6, Section 3.3.1

Enterprise value is useful for valuing businesses where a change of control is envisaged. It allows the potential purchaser to impose their own required capital structure.

37. A Chapter 5, Section 2.2

Option 1 has the highest value due to the highest exercise price and longest maturity.

- **Exercise Price** – the exercise price, also known as the strike price, is the price at which the option holder has the right to buy (in the case of a call option) or sell (in the case of a put option) the underlying asset. A lower exercise price for a call option or a higher exercise price for a put option increases option value.
- **Time to Expiration** – the amount of time remaining until the option's expiration is a critical determinant. Generally, the longer the time to expiration, the higher the option value. This is because a longer time period allows for more opportunities for the option to become profitable.

38. C Chapter 4, Section 5.2

Year 3 saw the company's highest weighted average cost of capital at 5.75%, this can be seen from using the WACC formula below:

$$WACC = (K_e \times \frac{MV_e}{MV_e + MV_d}) + (K_d(1-t) \times \frac{MV_d}{MV_e + MV_d})$$

Where:

K_e = cost of equity

K_d = cost of debt after tax

MV_d = value of debt

MV_e = value of equity

t = tax rate

Market value of equity: £8,300,000

Market value of debt: £3,400,000

Cost of equity (K_e): 8.5%

Cost of debt after tax (K_d): 5.75%

Year 3 WACC = $(8.5 \times 8.3 / 8.3 + 3.4) + (5.75 \times 3.4 / 3.4 + 8.3) = 7.70\%$

39. A Chapter 2, Section 5.1

Bond 1 will have the lowest Macaulay duration at 3.605531, this can be seen from calculations using the Macaulay duration formula below:

NPV	Bond 1	Bond 2	Bond 3	Bond 4
Year 1	7.56	6.58	3.82	4.49
Year 2	6.13	5.47	4.92	4.07
Year 3	5.71	4.88	4.13	3.98
Year 4	83.65	79.38	82.86	81.53
Total	103.05	96.31	95.73	94.07

	Bond 1	Bond 2	Bond 3	Bond 4
Year 1	7.56	6.58	3.82	4.49
Year 2	12.26	10.94	9.84	8.14
Year 3	17.13	14.64	12.39	11.94
Year 4	334.6	317.52	331.44	326.12
Total	371.55	349.68	357.49	350.69
Duration	3.605531	3.630776	3.734357	3.727969

40. C Chapter 6, Section 4.6.4

Option C is correct. The equity value is £1,011,636 and is calculated as follows:

FCFE = Net income + Depreciation – Capex + Net borrowing

$$= 100,000 + 20,000 - 28,000 + 15,000$$

$$= 107,000$$

Equity value = (FCFE (1+g)) / (Cost of equity – g)

$$= (107,000 (1+0.04)) / (0.15 - 0.04)$$

$$= 1,011,636$$

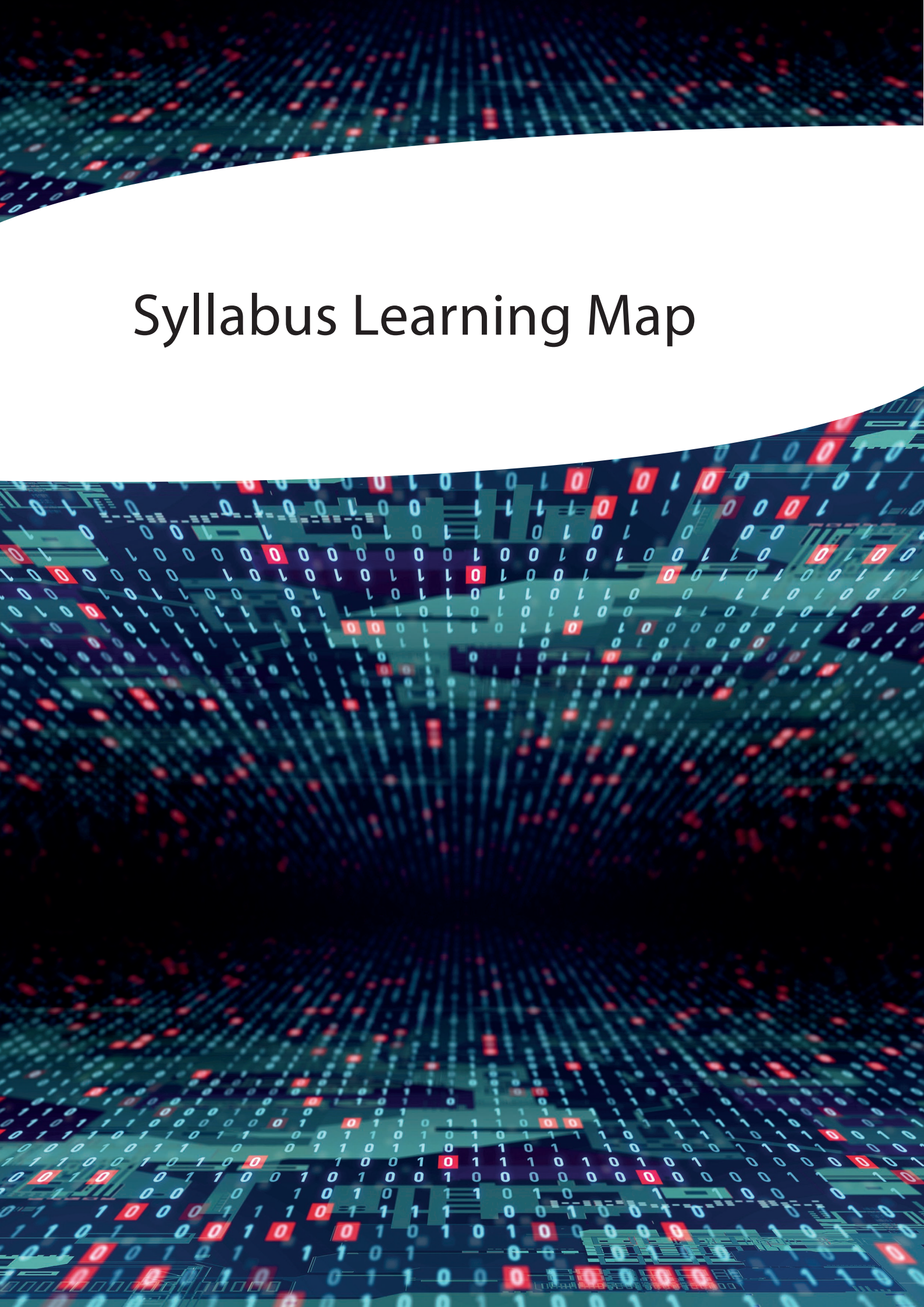
If we assume that FCFE is growing at a constant rate (g), the following formula can be used to calculate the value of equity by discounting FCFE at the cost of equity:

$$\text{Equity Value} = \frac{\text{FCFE}_0 (1+g)}{\text{Cost of equity} - g}$$

$$\text{FCFE} = \text{Net income} + \text{Depreciation} - \text{Capex} + \text{Net borrowing} = 100,000 + 20,000 - 28,000 + 15,000 = 107,000$$

Using the Equity Value equation shown above:

$$\text{Equity Value} = (107,000 (1+0.04)) / (0.15-0.04) = £1,011,636$$

The background of the page is a complex, abstract digital pattern. It features a dark blue and black base with numerous glowing red and white binary digits (0s and 1s) scattered across it. Overlaid on this are faint, greenish-blue circuit-like lines and patterns that resemble a network or data flow. The overall effect is a sense of depth and digital connectivity, with the patterns appearing to recede into the distance.

Syllabus Learning Map

Syllabus Unit/ Element		Chapter/ Section
Element 1	Equity Capital Market (ECM)	Chapter 1
1.1	Characteristics of Different Types of Equity Securities On completion, the candidate should:	
1.1.1	Know the basic characteristics of different classes of shares including the differences in ownership and voting rights	1
1.1.2	Be able to analyse the relative risk and return characteristics of different types of shares using a range of quantitative measures	1
1.1.3	Know the characteristics of depository receipts and their use for investing in non-domestic equity securities	1
1.2	Public Equity On completion, the candidate should:	
1.2.1	Understand the difference between an Equity Shares Commercial Company (ESCC) listing and an admission to AIM	2
1.2.2	Know the key stages of an initial public offering (IPO)	2
1.2.3	Understand the advantages and disadvantages of bringing securities to listing via: • Offer for sale • Placing • Intermediaries offer • Introduction	2
1.2.4	Know the various ways in which the offer price for shares in an IPO may be set	3
1.2.5	Understand the use of a 'greenshoe' option when issuing shares	3
1.2.6	Know the procedure for a rights issue and the rights of shareholders in relation to rights issues and open offers	3
1.2.7	Understand the meaning of the term pre-emption rights and the circumstances under which these can be disapplied	3
1.2.8	Know the general rules and accounting requirements when a company engages in a share repurchase	3

Syllabus Unit/ Element		Chapter/ Section
Element 2	Debt Capital Market (DCM)	Chapter 2
2.1	Types and Characteristics of Different Sources of Debt On completion, the candidate should:	
2.1.1	Know the basic characteristics of short-term unquoted sources of debt finance including overdraft facilities, revolving credit facilities, working capital, debt factoring and invoice discounting	1
2.1.2	Know the basic characteristics of the following types of debt instruments: • Redeemable bonds • Irredeemable/perpetual bonds • Zero-coupon bonds • Convertible bonds • Callable and puttable bonds • Contingent convertible bonds (CoCos) • Exchangeable bonds • Medium term notes • Eurobonds • Green bonds • Blue bonds • Transition bonds • Commercial paper • Floating rate notes	2
2.2	Bond Pricing and Returns On completion, the candidate should:	
2.2.1	Be able to analyse the price of a bond given a market discount rate	3
2.2.2	Know what is meant by a bond's yield to maturity and the sources of return from investing in a fixed coupon bond	3
2.2.3	Know the relationship between bond prices and interest rates	3
2.2.4	Be able to analyse the price of a bond given spot rates	3
2.2.5	Understand the use of matrix pricing for illiquid or infrequently traded bonds	3
2.2.6	Understand the relationship between bond prices and other bond characteristics such as time to maturity and coupon	3
2.2.7	Understand the valuation of convertible bonds	4
2.3	Risk Assessment On completion, the candidate should:	
2.3.1	Be able to analyse Macaulay duration and modified duration	5

Syllabus Unit/ Element		Chapter/ Section
2.3.2	Know what is meant by convexity in terms of the relationship between bond prices and interest rates	5
2.3.3	Be able to calculate a bond's price given the bond's duration and convexity	5
2.3.4	Know the benefits and limitations of duration including the impact of convexity	5
2.3.5	Understand other risk factors relevant to bonds such as credit risk, default risk, currency risk, call risk and re-investment risk	5
Element 3	Alternative Sources of Finance	Chapter 3
3.1	Characteristics and Examples of Alternative Sources of Finance On completion, the candidate should:	
3.1.1	Know the characteristics, special features, pros and cons of the following sources of finance: • Private equity and venture capital (including venture capital trusts (VCTs)), angel finance and crowd funding • Private placings • Enterprise Investment Schemes (EISs) • Banks • Leases • Project finance • Senior, mezzanine and other debt • Sovereign wealth funds • Government-backed finance • Family offices	1
3.2	Appropriate use of Alternative Sources of Finance On completion, the candidate should:	
3.2.1	Understand the circumstances under which alternative sources of finance will be deemed appropriate for: • A new start up • An early stage project • Developmental capital • A management buy-out or management buy-in • A re-organisation or turnaround • A public company	2

Syllabus Unit/ Element		Chapter/ Section
Element 4	The Cost of Capital	Chapter 4
4.1	The Cost of Equity On completion, the candidate should:	
4.1.1	Understand the assumptions, pros and cons of the dividend growth model	1
4.1.2	Be able to analyse the cost of equity using the dividend growth model	1
4.1.3	Understand systematic risk, unsystematic risk and beta as a measure of relative risk	1
4.1.4	Understand the capital asset pricing model (CAPM), its assumptions, pros and cons	1
4.1.5	Be able to analyse the cost of equity using CAPM	1
4.2	The Cost of Debt On completion, the candidate should:	
4.2.1	Be able to calculate the cost of irredeemable and redeemable bonds	2
4.2.2	Be able to calculate the impact of taxation on the cost of debt	2
4.3	Overall Cost of Capital On completion, the candidate should:	
4.3.1	Be able to analyse an entity's weighted average cost of capital (WACC)	3
4.3.2	Know the difference between book value and market value weightings when calculating WACC	3
4.4	Capital Structure Decisions On completion, the candidate should:	
4.4.1	Be able to analyse how gearing affects the cost of equity, debt and overall WACC	4
4.4.2	Be able to analyse project-specific discount rates with specific focus on equity and asset betas	5
4.4.3	Know Modigliani and Miller's theory on capital structure and the assumptions behind the theory both with and without taxation	6
4.4.4	Be able to analyse the effect of taxes on capital structure decisions	7

Syllabus Unit/ Element		Chapter/ Section
Element 5	Capital Budgeting	Chapter 5
5.1	Investment Appraisal Methods On completion, the candidate should:	
5.1.1	Be able to analyse the payback and discounted payback period of an investment	1
5.1.2	Be able to analyse the return on capital employed (ROCE) of an investment	1
5.1.3	Be able to analyse the net present value (NPV) of an investment	1
5.1.4	Be able to analyse the internal rate of return (IRR) and modified internal rate of return (MIRR) of an investment	1
5.1.5	Understand the usefulness of adjusted present value (APV) as an investment appraisal method	1
5.1.6	Know the relative pros and cons of the various investment appraisal methods	1
5.2	Option Pricing Theory in Investment Appraisal On completion, the candidate should:	
5.2.1	Be able to analyse the following drivers of option value: • Value of the underlying • Exercise price • Time to expiry • Volatility • The risk-free rate	2
5.2.2	Understand real options in investment appraisal: options to delay, expand or withdraw	2
5.2.3	Know the underlying assumptions and limitations of the Black-Scholes Option Pricing (BSOP) model in valuing real options	2
5.3	Project Appraisal and Risk On completion, the candidate should:	
5.3.1	Be able to apply the use of sensitivity analysis in evaluating investment projects	3
5.3.2	Understand the use of Monte Carlo simulation in evaluating investment projects	3
5.3.3	Understand how environmental, social and governance (ESG) issues can affect capital investment decisions	3

Syllabus Unit/ Element		Chapter/ Section
Element 6	Company Valuation	Chapter 6
6.1	Asset-Based Valuation On completion, the candidate should:	
6.1.1	Know the difference between: • market value • transaction value • book value	1
6.1.2	Understand the uses, assumptions and limitations of asset-based valuations	1
6.1.3	Be able to analyse equity value using an asset-based valuation approach	1
6.2	Dividend-Based Valuation On completion, the candidate should:	
6.2.1	Understand the uses, assumptions and limitations of dividend-based valuations	2
6.2.2	Be able to analyse equity value using the dividend-based valuation approach	2
6.3	Earnings-Based Valuation On completion, the candidate should:	
6.3.1	Know the difference between intrinsic value and relative value	3
6.3.2	Understand the uses, assumptions and limitations of earnings-based valuations	3
6.3.3	Be able to analyse equity value using P/E multiples	3
6.3.4	Be able to analyse enterprise value using EBIT/EBITDA multiples	3
6.3.5	Understand the differences between EBIT and EBITDA and when it is appropriate to use each one	3
6.4	Cash Flow-Based Valuation On completion, the candidate should:	
6.4.1	Understand the uses, assumptions and limitations of cash flow-based valuations	4
6.4.2	Be able to calculate equity value using a cash flow-based valuation model (including growth)	4
6.5	Enterprise Value versus Equity Value On completion, the candidate should:	
6.5.1	Know what is meant by enterprise value, its uses and how it differs from equity value	3

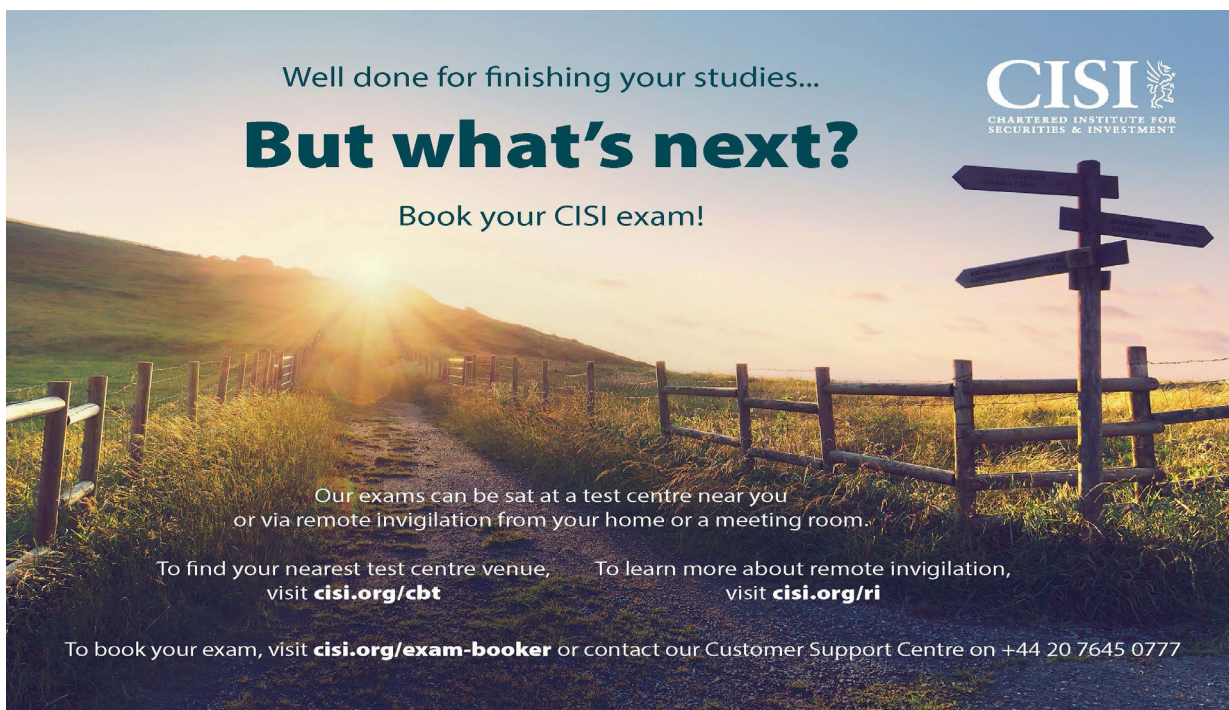
Syllabus Unit/ Element		Chapter/ Section
6.5.2	Be able to analyse enterprise value using a cash flow-based valuation approach, incorporating free cash flows (including adjustments for normalised working capital), terminal value and varying time horizons and growth assumptions	4
Element 7	Derivatives and Risk Management	Chapter 7
7.1	Types of Risk On completion, the candidate should:	
7.1.1	Understand interest rate risk	1
7.1.2	Understand foreign exchange risk	1
7.2	Using Derivatives to Manage Risk On completion, the candidate should:	
7.2.1	Be able to analyse the use of the following in hedging interest rate and foreign currency risk: forward contracts; futures contracts; options; swaps	2

Examination Specification

Each examination paper is constructed from a specification that determines the weightings that will be given to each element. The specification is given below.

It is important to note that the numbers quoted may vary slightly from examination to examination as there is some flexibility to ensure that each examination has a consistent level of difficulty. However, the number of questions tested in each element should not change by more than plus or minus 2.

Element Number	Element	Questions
1	Equity Capital Market (ECM)	6
2	Debt Capital Market (DCM)	8
3	Alternative Sources of Finance	2
4	The Cost of Capital	7
5	Capital Budgeting	7
6	Company Valuation	8
7	Derivatives and Risk Management	2
Total		40



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