The Institute of Chartered Accountants of Bangladesh

STUDY MANUAL

FINANCIAL MANAGEMENT

CA Professional Level

Financial Management
The Institute of Chartered Accountants of Bangladesh Professional Level

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Contents

1 Introduction

CA Overview

The ICAB chartered accountancy qualification, the CA, is one of the most advanced learning and professional development programmes available. Its integrated components provide you with an in-depth understanding across accountancy, finance and business. Combined, they help build the technical knowledge, professional skills and practical experience needed to become an ICAB Chartered Accountant.

Each component is designed to complement each other, which means that students put theory into practice and can understand and apply what they learn to their day-to-day work. The components are:

Professional development

ICAB Chartered Accountants are known for their professionalism and expertise. Professional development will prepare you to successfully handle a variety of different situations that you'll encounter throughout your career.

The CA qualification improves your ability and performance in seven key areas:

- adding value
- communication
- consideration
- decision making
- problem solving
- team working
- technical competence.

Ethics and professional scepticism

Ethics is more than just knowing the rules around confidentiality, integrity, objectivity and independence.

It's about identifying ethical dilemmas, understanding the implications and behaving appropriately. We integrate ethics throughout the CA qualification to develop your ethical capabilities – so you'll always know how to make the right decisions and justify them.

3-4 years practical work experience

Practical work experience is done as part of a training agreement with one of ICAB Member in practice authorised to train students. Students need to complete articleship for a period of three/ four years. The knowledge, skills and experience they gain as part of their articleship agreement are invaluable, giving them the opportunity to put what they're learning into practice.

17 accountancy, finance and business modules

You will gain in-depth knowledge across a broad range of topics in accountancy, finance and business. The modules are designed to fit with your practical experience, so you constantly progress through the qualification.

There are 17 modules over three levels. These can be taken in any order with the exception of the Case Study which has to be attempted last. You must pass every exam (or receive credit) – there are no options. This ensures that once qualified, all ICAB Chartered Accountants have a consistent level of knowledge, skills and experience.

Certificate Level

There are seven modules that will introduce the fundamentals of accountancy, finance and business.
They each have a 2 hours examination except 'Principle of Taxation' which will be of 3 hours, and Business Law, IT each will be 1.5 hours duration. Students may be eligible for credit for some modules if they have studied accounting, finance, law or business at degree level or through another professional qualification.

Investment appraisal techniques are introduced in Management Information. An application of how businesses are set up and organised from a capital perspective is part of Business and Finance. These two Certificate Level modules are the foundations of Financial Management.

Professional Level

The next seven modules build on the fundamentals and test your understanding and ability to use technical knowledge in real-life scenarios. Each module has a 3 hour exam, which are available to sit two times per year. These modules are flexible and can be taken in any order. The Business Planning: Taxation and Business Strategy modules in particular will help you to progress to the Advanced Level.

The knowledge base that is put into place at Certificate Level is developed further in the Financial Management module. Here, the aim is to enable you to recommend options for financing a business, recognise and manage links and make appropriate investment decisions.

Advanced Level

The Advanced Level module of Corporate Reporting requires you to apply the technical knowledge you have built at Professional Level, along with analytical techniques and professional skills, to resolve compliance and business issues that arise in the context of the preparation and evaluation of corporate reports and from providing audit services. At the Strategic Business Management module, you will need to demonstrate quantitative and qualitative skills to make realistic business recommendations in complex scenarios. You will also need to demonstrate business awareness at strategic, operating and transactional levels. These modules have a 3 hour exam and are available to sit twice a year.

The Case Study will require you to provide advice in respect of complex business issues, and will assess your ability to analyse financial and non-financial data, exercise professional and ethical judgement, and develop conclusions and recommendations. The Case Study is a 4 hour exam and is available to sit twice a year.

The above diagram illustrates how the knowledge of financial management principles gives a platform from which a progression of skills and financial management expertise is developed.

For more information on the CA qualification exam structure and syllabus, visit ICAB.org.bd/students

2 Financial Management

2.1 Module aim

To enable candidates to recommend relevant options for financing a business, recognise and manage financial risks and make appropriate investment decisions.

2.2 Specification grid

This grid shows the relative weightings of subjects within this module and should guide the relative study time spent on each. Over time the marks available in the assessment will equate to the weightings below, while slight variations may occur in individual assessments to enable suitably rigorous questions to be set.

	Weighting (%)
Financing options	35
Managing financial risk	30
Investment decisions and valuation	35
	100

Your exam will consist of one part consisting of long form written test questions worth 100 marks.

The exam may consist of three or four questions.

Time available 2.5 hours.

CHAPTER 1

Objectives

Introduction

Examination context

Topic List

1 Business and financial strategy

2 Stakeholders and their objectives

Summary and Self-test

Answers to Interactive questions

Answers to Self-test

Introduction

Learning objectives

	Tick off
• To explain the general objectives of financial management	☐
• To explain the roles played by different stakeholders in the financial strategy selected by a business	☐
• To identify possible conflicts of objectives between different stakeholders	☐

The syllabus references that relate to this chapter are 1a, b, d, e and f.

Syllabus links

The area of corporate governance is more rigorously explored in the **Business and Finance** and **Assurance** papers. The financial strategy of a business will be strongly influenced by the business strategy chosen, hence this subject needs to be viewed in the context of the topics explained in **Business Strategy**.

In terms of linkages within Financial Management, this chapter provides a backdrop against which the techniques and topics explored in this study manual can be viewed. It inevitably makes reference to ideas and terminology that are explored more fully in later chapters. Consequently this chapter should be returned to after studying the other chapters in this manual.

Examination context

In the exam, candidates may be required to discuss the likely objectives of various stakeholders, and comment upon how conflicting objectives might be reconciled.

1 Business and financial strategy

Section overview

- Strategic planning addresses the long-term direction of the business.
- Business strategy is concerned with how the business will achieve its objectives.
- Financial strategy is concerned with the financial implications of the business strategy.

1.1 What is strategy?

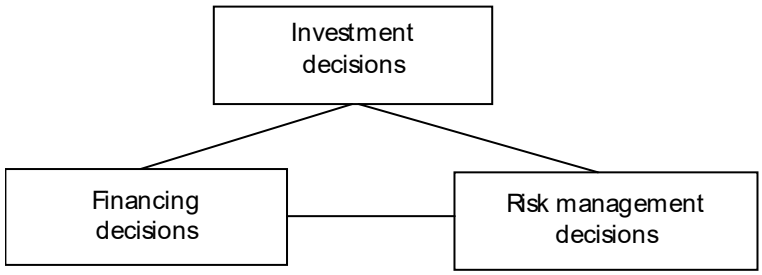
Most businesses will undertake some form of **strategic planning** (either formally or informally). Strategic planning is concerned with the long-term direction of the business (eg which products should it sell in which markets), and how the business will achieve its objectives, ie its business strategy (or strategies). The **Business Strategy** exam deals with much of the detail relating to strategic planning and business strategy, eg how in order for a business to achieve its objectives it must interact with its environment, its available resources (eg physical and human assets) and its stakeholders.

1.2 Financial strategy

This is concerned with the **financial aspects** of the strategic planning process, so in reality they are part and parcel of the same overall picture. This chapter examines some of the financial strategy aspects of setting objectives and dealing with stakeholders.

Having decided on its overall direction and objectives a firm must then make more detailed supporting financial decisions over the medium to short term. The Financial Management syllabus is concerned with three broad categories of these financial decisions which must be made, and these are outlined below.

Other aspects of short-term decision making are dealt with in some of the other examination papers, eg budgeting and variances are covered in the Management Information paper.



Three categories of financial decisions

1.3 Investment decisions

These are concerned with how a firm decides whether, for example, to buy plant and equipment or introduce a new product to the market.

Investment decisions were introduced in Management Information, and are taken further in Chapter 2. These are of fundamental importance, particularly as there is a risk that things could go wrong. For example, if a firm introduces a new product and demand for it turns out to be far less than expected then, depending on the size of the investment made, the future of the firm could be in jeopardy. Even if it survives, it will probably have to explain itself to its investors (eg shareholders, banks).

1.4 Financing decisions

These are concerned with such matters as how a firm should be financed – solely by equity (shares) or by a combination of equity and debt, and in what proportions.

Financing decisions are discussed in Chapters 4 and 5 and can be fundamental to a firm's existence. In times of recession firms that have borrowed heavily often go bankrupt because cash flows have fallen to a level insufficient to make interest payments on debt. It is for this type of reason that a greater amount of equity finance (on which dividend payments are discretionary) may be preferable to debt. This is discussed further in Chapter 6.

1.5 The dividend decision

An important aspect of 'financing decisions' is the 'dividend decision'; this is concerned with whether or not a firm should pay a dividend and, if one is to be paid, how much that dividend should be.

Of particular importance here are the effects of cutting dividends – what will be the reaction of shareholders facing a cut in their income? If the company is quoted what will this do to the share price?

These issues are discussed in Chapter 7.

1.6 Risk management decisions

These are concerned with how a business manages risk in relation to investment decisions, financing decisions and liquidity, currency and credit decisions.

Aspects of risk and uncertainty surrounding investment appraisal are explored in Chapter 3. Financial risks such as currency and interest rate changes have created the need for risk reduction or hedging strategies. These are explored in Chapters 9 and 10.

1.7 Inter-relationships

There are inter-relationships between all of these decisions. Chapter 8 explores business planning, which brings together investment and finance decisions.

Worked example: Inter-relationships

Relationship	Example
A company's chosen **business strategy** will determine the necessary **investment decisions** to put into place the required assets	A retailing company makes a strategic decision to widen its markets
	↓ Investment in new stores
The new assets trigger a demand for capital ie **financing decisions**	A new issue of debt is made
	↓
The ongoing implementation of the strategy causes cashflow demands, as well as a different risk profile which requires **risk management** decisions to be taken.	Overseas expansion creates a need for hedging activity

1.8 Financial economics

Financial economics is covered in this Financial Management study manual as follows:

- Discounted cash flows and NPV – see chapters 2 and 3.
- Financial economic models such as CAPM and Modigliani and Miller – see chapters 3 and 6.

2 Stakeholders and their objectives

Section overview

- A stakeholder is someone who has an interest in the performance of a firm
- Shareholders' objective – of wealth maximisation – is the primary objective
- Companies have a framework of objectives, which may be in conflict with one another

2.1 Objective

In order to make the decisions noted above, what those decisions are trying to achieve must be known, ie what is the objective? Your objective (hopefully) is to pass your Financial Management examination. However, what are the objective(s) of a firm? This depends on the objectives of the stakeholders who make up the firm.

Stakeholders are individuals or groups who have an interest in the performance of a firm although their various goals may not always coincide.

Interactive question 1: Stakeholder objectives

[Difficulty level: Easy]

Question	Fill in your answer
• Who are the main stakeholders in a business and what are their likely objectives?	
• How might they conflict?	
• How might the conflict be resolved?	

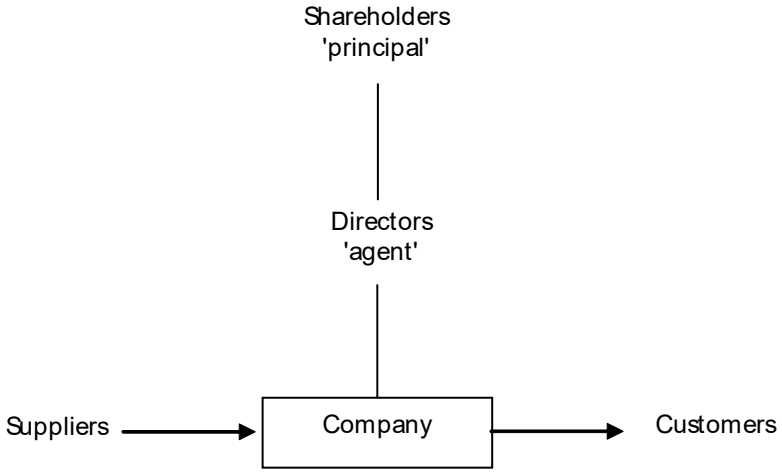
See **Answer** at the end of this chapter.

2.2 Conflict and an overriding objective

Return	It is generally accepted that the interests of **shareholders** should be put first (at least as a starting point in the decision making process). This means aiming to take decisions which **maximise the wealth** of the shareholders. Wealth is measured by the value of the firm's shares, which reflects the net present value of any projects taken on by the firm. The share price also takes into account the returns to the shareholders in terms of dividend payments and the risk attached to those returns.
Risk	Risk may be viewed as the likelihood of the returns being achieved. Logically, therefore, if two firms produce the same returns but with different risks, the less risky firm will be worth more.
Stakeholders	The existence of **multiple stakeholders** can lead to **multiple objectives**. These objectives may or may not be in conflict. For example, it seems reasonable to assume that a well-motivated workforce whose objectives of pay, security and conditions are met is consistent with a profitable and stable future for a firm and its shareholders. On the other hand, if controlling pollution imposes increased costs on a firm (through government legislation), then returns to shareholders may be reduced.
Shareholders	By focusing on a **single objective** (that of increasing shareholder wealth) clear decisions can be made. The rest of this manual develops the decision making tools which link to this objective. Once the basic decision is made in terms of whether or not shareholder wealth is maximised, the complications of multiple (conflicting) objectives can be taken into account.
Satisficing	The firm may then attempt to **'satisfice'** – that is make decisions which allow for the (partial) satisfaction of the stakeholder objectives but which do not fully maximise shareholder wealth.

2.3 Agency theory and managerial objectives

The relationships between the various interested parties in the firm are often described in terms of agency theory. Agency relationships occur when one party, the principal, employs another party, the agent, to perform a task or a set of tasks, on his behalf. In many of these principal/agent relationships conflicts of interest can exist.



One of the most important of these potential conflicts is between shareholders (principals) and directors (agents). Though both of these parties tend to have similar objectives for the firm, there can be differences. With some firms, shareholders insist that part of the directors' remuneration is linked to the extent to which shareholders' wealth is enhanced. For instance, directors are sometimes given long-term share option schemes. Sometimes management audits are used to monitor the actions of the directors. These arrangements have a cost to the shareholders, often referred to as agency costs.

Some of these agency costs will be considered in later chapters.

Interactive question 2: Conflicts between shareholders and directors

[Difficulty level: Easy]

Specific areas in which conflicts of interest might occur between directors and shareholders include the following.

- Takeovers

- Time horizon

- Risk

- Debt

For each of these, explain why the directors might pursue an agenda which is at odds with the maximisation of shareholder wealth.

See **Answer** at the end of this chapter.

Practical illustrations

It has been argued that in the 1990s directors used maximising shareholder wealth (or shareholder value) as a cover to do what they wanted. Shareholders were not concerned as rising share prices kept them happy whilst directors profited from share option schemes. Then came major falls in world stock markets and revelations that criminal behaviour had been used to achieve higher share prices. A dramatic example of this is Enron.

> Enron was initially an energy producer, but moved onto the trading of energy and water – these commodities can be bought, sold, and hedged just like shares and bonds. By taking risky positions in these energy products, Enron grew to become America's seventh largest company, employing 21,000 staff in more than 40 countries.
>
> *Fortune* magazine named Enron 'America's Most Innovative Company' for six consecutive years from 1996 to 2001. In one year, Ken Lay – Enron's founder and former chairman – earned $252m including stock options.
>
> The desire to maintain a profitable face to the outside world however resulted in the collapse of the company.
>
> Jeffrey Skilling, Enron's former chief executive, faced 28 counts of fraud, conspiracy, insider trading and lying to auditors for allegedly trying to fool investors into believing Enron was healthy before the firm crashed. Skilling was jailed for 24 years.
>
> Ken Lay had faced six counts of fraud and conspiracy for perpetuating the scheme after Skilling quit in August 2001. Ken Lay died after being convicted.
>
> Enron left behind $31.8bn (£18bn) of debts; its shares became worthless, and 21,000 workers around the world lost their jobs.

Shareholders have now begun to flex their muscles and take a much more active interest in what companies and directors are doing, eg the chairman of Royal Dutch/Shell was forced to step down. Michael Eisner of Disney was obliged to give up his chairmanship (but not the chief executiveship) after 43% of shareholders voted against his reappointment.

2.4 Ethical considerations

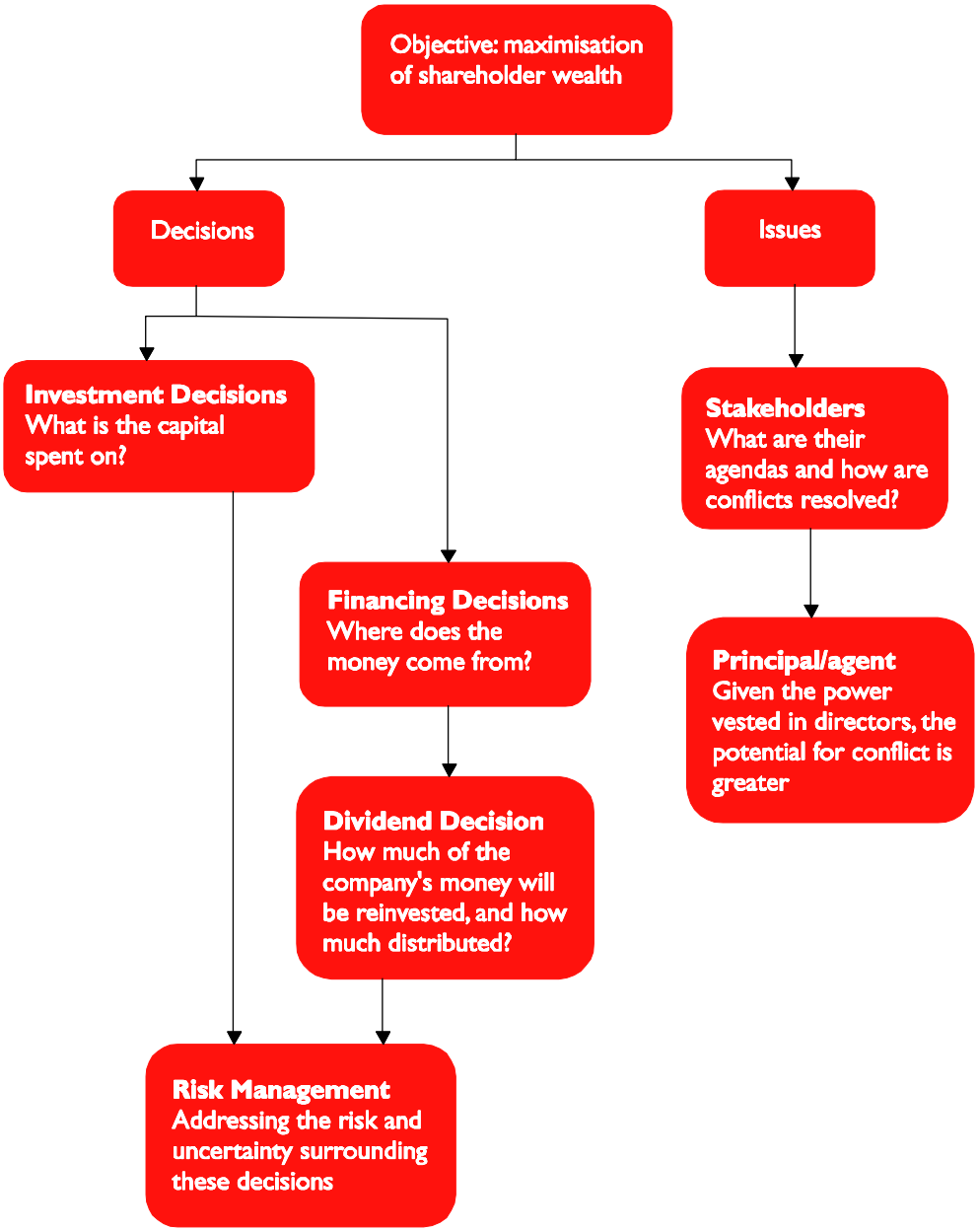
Directors/managers (and shareholders) are often faced with ethical considerations in setting objectives and making financial decisions, for example increasing profits by using foreign child labour; polluting the environment or using non-renewable energy because it is cheaper, or exploiting superior (inside) information. A firm's value can depend very much on its reputation. Many, such as the major banks, spend years building trust with customers and

suppliers, establishing a name for fair dealing and financial integrity. Fraud, allegations of dishonesty or a reputation for sharp business practice and so on can undermine years of hard work and with it, shareholder value.

Some businesses explicitly state their ethical principles in order to distinguish themselves, eg Body Shop (animal testing), Co-op (fair trade).

Summary and Self-test

Summary



Self-test

Answer the following questions.

1 'Financial managers need only concentrate on meeting the needs of shareholders by maximising earnings per share – no other group matters.'

Discuss. **(10 marks)**

2 Many decisions in financial management are taken in a framework of conflicting stakeholder viewpoints. Identify the stakeholders and some of the financial management issues involved in the following situations:

(a) A private company converting into a public company.

(b) A highly geared company, such as Eurotunnel, attempting to restructure its capital.

(c) A large conglomerate 'spinning off' its numerous divisions by selling them, or setting them up as separate companies (eg Hanson).

(d) Japanese car-makers, such as Nissan and Honda, building new car plants in other countries.

(10 marks)

3 Assume you are Finance Director of a large multinational company, listed on a number of international stock markets. The company is reviewing its corporate plan. At present, the company focuses on maximising shareholder wealth as its major goal. The Managing Director thinks this single goal is inappropriate and asks his co-directors for their views on giving greater emphasis to the following:

(i) Cash flow generation

(ii) Profitability as measured by profits after tax and return on investment

(iii) Risk-adjusted returns to shareholders

(iv) Performance improvement in a number of areas such as concern for the environment, employees' remuneration and quality of working conditions and customer satisfaction

Requirement

Provide the Managing Director with a report for presentation at the next board meeting which:

(a) Discusses the argument that maximisation of shareholder wealth should be the only true objective of a firm, and

(b) Discusses the advantages and disadvantages of the MD's suggestions about alternative goals.

(10 marks)

4 A company is considering improving the methods of remuneration for its senior employees. As a member of the executive board, you are asked to give your opinions on the following suggestions:

(a) A high basic salary with usual 'perks' such as company car, pension scheme etc but no performance-related bonuses

(b) A lower basic salary with usual 'perks' plus a bonus related to their division's profit before tax

(c) A lower basic salary with usual 'perks' plus a share option scheme which allows senior employees to buy a given number of shares in the company at a fixed price at the end of each financial year

Requirement

Discuss the arguments for and against *each* of the *three* options from the point of view of both the company and its employees. Detailed comments on the taxation implications are *not* required.

(10 marks)

Now, go back to the Learning Objectives in the Introduction. If you are satisfied you have achieved those objectives, please tick them off.

Answers to Interactive questions

Answer to Interactive question 1

- Shareholders may be interested in the dividends they receive and the price of their shares (assuming they are quoted);
- Managers may be interested in their salary, perks (eg office size), relative power, etc;
- Employees may be interested in their pay, security of employment, working conditions, etc;
- Unions tend to have the same objectives as employees;
- Government may be interested in ensuring that firms do nothing illegal, pay appropriate taxes, etc;
- Society at large may be interested, for example in ensuring that pollution levels are kept to a minimum;
- The conflicts are perhaps apparent. Shareholder returns will be compromised in the short term by allowing other stakeholders' objectives to be achieved;
- The resolution of this conflict is typically achieved in the longer term, as motivated managers, loyal customers etc are likely to result in a more successful company. For example, greater sales, harder working employees, committed suppliers all contribute to higher growth, higher prices and a higher share price, hence maximising shareholder wealth.

Answer to Interactive question 2

- **Takeovers**

  Victim company managers often devote large amounts of time and money to 'defend' their companies against takeover. However, research has shown that shareholders in companies that are successfully taken over often earn large financial returns. On the other hand, managers of companies that are taken over frequently lose their jobs! This is a common example of the conflict of interest between the two groups.

- **Time horizon**

  Managers know that their performance is usually judged on their short-term achievements; shareholder wealth, on the other hand, is affected by the long-term performance of the firm. Managers can frequently be observed to be taking a short-term view of the firm which is in their own best interest but not in that of the shareholders.

- **Risk**

  Shareholders appraise risks by looking at the overall risk of their investment in a wide range of shares. They do not have 'all their eggs in one basket', unlike managers whose career prospects and short-term financial remuneration depend on the success of their individual firm.

- **Debt**

  As managers are likely to be more cautious over risk than shareholders, they might wish to adopt lower levels of debt than would be optimal for the shareholders.

Answers to Self-test

1 **Profit maximisation**

One of the principles of the market economy is that if the owners of businesses attempt to achieve **maximum profitability** and **earnings** this will help to increase the wealth of society. As a result, it is usually assumed that a proper objective for private sector organisations is profit maximisation. This view is substantially correct. In general, the market economy has out-performed planned economies in most places in the world. Two key objectives of financial managers must therefore be the **effective management** of shareholders' funds and the provision of financial information which will help to increase shareholder wealth.

Problems with profit maximisation

However, profit-seeking organisations can also cause problems for society. For example, **monopolists** are able to earn large returns which are disproportionate to the benefits they bring to society. The **costs of pollution** fall on society rather than on the company which is causing it. A company may increase profitability by making some of its work-force redundant but the costs of unemployed people fall on society through the social security system.

The question that then follows is 'Should individual companies be concerned with these market imperfections?'

Government's role

There are two opposing viewpoints. On the one hand it can be argued that companies should only be concerned with **maximisation of shareholders' wealth**. It is the role of government to pick up the problems of market imperfections (eg by breaking up monopolies, by fining polluters and by paying social security benefits).

Stakeholder interests

An alternative viewpoint is that a company is a coalition of **different stakeholder** groups: shareholders, lenders, directors, employees, customers, suppliers, government and society as a whole. The objectives of all these groups, which are often in conflict, need to be considered by company managers when making decisions. From this viewpoint, financial managers cannot be content with meeting the needs of shareholders only.

Consideration of stakeholders

The truth is somewhere in between. The over-riding objective of companies is to create **long-term wealth for shareholders**. However this can only be done if we consider the likely behaviour of other stakeholders. For example, if we create extra short-term profits by cutting employee benefits or delaying payments to creditors there are likely to be **repercussions** which reduce longer term shareholder wealth. Or if we fail to motivate managers and employees adequately, the costs of the resulting inefficiencies will ultimately be borne by shareholders.

Conclusion

In summary, the financial manager is concerned with **managing the company's funds** on behalf of shareholders, and **producing information** which shows the likely effect of management decisions on shareholder wealth. However management decisions will be made after also considering other stakeholder groups and a good financial manager will be aware that financial information is only one input to the final decision.

2 (a) **A private company converting into a public company**

When a private company converts into a public company, some of the existing shareholders/managers will sell their shares to outside investors. In addition, new shares may be issued. The **dilution of ownership** might cause loss of control by the existing management.

The stakeholders involved in potential conflicts are as follows.

(1) **Existing shareholders/managers**

They will want to sell some of their shareholding at as high a price as possible. This may motivate them to overstate their company's prospects. Those shareholders/managers who wish to retire from the business may be in conflict with those who wish to stay in control – the latter may oppose the conversion into a public company.

(2) **New outside shareholders**

Most of these will hold **minority stakes** in the company and will receive their rewards as **dividends only**. This may put them in conflict with the existing shareholders/managers who receive rewards as salaries as well as dividends. On conversion to a public company there should be clear policies on dividends and directors' remuneration.

(3) **Employees, including managers who are not shareholders**

Part of the reason for the success of the company will be the efforts made by employees. They may feel that they should benefit when the company goes public. One way of organising this is to create **employee share options** or other bonus schemes.

(b) **A highly geared company attempting to restructure its capital**

The major conflict here is between **shareholders** and **lenders**. If a company is very highly geared, the shareholders may be tempted to take very high risks. If the gamble fails, they have limited liability and can only lose the value of their shares. If they are lucky, they may make returns many times the value of their shares. The problem is that the shareholders are effectively gambling with money provided by lenders, but those lenders will get no extra return to compensate for the risk.

Removal of risk

In restructuring the company, something must be done either to shift risk away from the lenders or to reward the lenders for taking a risk.

Risk can be **shifted away** from lenders by taking **security** on previously unsecured loans or by **writing restrictive covenants** into loan agreements (eg the company agrees to set a ceiling to dividend pay-outs until gearing is reduced, or to confine its business to agreed activities).

Lenders can be **compensated** for taking risks by either negotiating increased interest rates or by the issue of 'sweeteners' with the loans, such as share warrants or the issue of convertible loan stock.

Other stakeholders

Other stakeholders who will be interested in the arrangements include **trade creditors** (who will be interested that loan creditors do not improve their position at the expense of themselves) and **managers**, who are likely to be more risk averse than shareholders if their livelihood depends on the company's continuing existence.

(c) **A large conglomerate spinning off its divisions**

Large conglomerates may sometimes have a market capitalisation which is less than the total realisable value of the subsidiaries. This is referred to as **'conglomerate discount'**. It arises because more synergy could be found by the combination of the group's businesses with competitors than by running a diversified group where there is no obvious benefit from remaining together.

For many years, Hanson Trust was the exception to this situation, but subsequently it decided to break up the group.

The stakeholders involved in potential conflicts are as follows.

(1) **Shareholders**

They will see the chance of immediate gains in share price if subsidiaries are sold.

(2) **Subsidiary company directors and employees**

They may either gain opportunities (eg if their company becomes independent) or suffer the threat of job loss (eg if their company is sold to a competitor).

(d) **Japanese car makers building new car plants in other countries**

The stakeholders involved in potential conflicts are as follows.

(1) **The shareholders and management of the Japanese company**

They will be able to gain from the combination of advanced technology with a cheaper workforce.

(2) **Local employees and managers engaged by the Japanese company**

They will gain **enhanced skills** and better **work prospects**.

(3) **The government of the local country, representing the tax payers**

The **reduction** in **unemployment** will ease the taxpayers' burden and increase the government's popularity (provided that subsidies offered by the government do not outweigh the benefits!)

(4) **Shareholders, managers and employees of local car-making firms**

These will be in **conflict** with the **other stakeholders** above as existing manufacturers lose market share.

(5) **Employees of car plants based in Japan**

These are likely to **lose work** if car-making is relocated to lower wage areas. They will need to compete on the basis of **higher efficiency**.

3 **REPORT**

To: Managing Director
From: Finance Director
Date: 17 November 20X5
Subject: Discussion of corporate objectives

Introduction

1 This report has been drafted for use as a discussion document at the forthcoming board meeting. It deals with the validity of continuing to operate with the single major goal of **shareholder wealth maximisation**. The remaining sections of the report contain an analysis of the advantages and disadvantages of some of the alternative objectives that have been put forward in recent discussions.

Maximisation of shareholder wealth

2 The concept that the **primary financial objective** of the firm is to **maximise** the **wealth** of shareholders, by which is meant the **net present value** of estimated future cash flows, underpins much of modern financial theory.

3 While the relevance of the wealth maximisation goal is under discussion, it might also be useful to consider the way in which this type of objective is defined, since this will impact upon both parallel and subsidiary objectives. A widely adopted approach is to seek to **maximise the present value of the projected cash flows**. In this way, the objective is both made measurable and can be translated into a

yardstick for financial decision making. It cannot be defined as a single attainable target but rather as a criterion for the continuing allocation of the company's resources.

4 There has been some recent debate as to whether wealth maximisation should or can be the only true objective, particularly in the context of the multinational company. The **stakeholder view** of corporate objectives is that **many groups** of people have a stake in what the company does. Each of these groups, which include suppliers, workers, managers, customers and governments as well as shareholders, has its own objectives, and this means that a compromise is required. For example, in the case of the multinational firm with a facility in a politically unstable third world economy, the directors may at times need to place the **interests of the local government and economy** ahead of those of its shareholders, in part at least to ensure its own continued stability there.

Cash flow generation

5 The validity of **cash flow generation** as a major corporate objective depends on the timescale over which performance is measured. If the business maximises the net present value of the cash flows generated in the medium to long term, then this objective is effectively the same as that discussed above. However, if the aim is to **maximise all cash flows**, then decisions are likely to be disproportionately focused on **short-term performance**, and this can work against the long-term health of the business. Defining objectives in terms of long-term cash flow generation makes the shareholder wealth maximisation goal more clearly definable and measurable.

Profitability

6 Many companies use **return on investment (ROI)** targets to **assess performance** and **control the business**. This is useful for the comparison of widely differing divisions within a diverse multinational company, and can provide something approaching a 'level playing field' when setting targets for the different parts of the business. It is important that the **measurement techniques** to be used in respect of both profits and the asset base are very clearly defined, and that there is a clear and consistent approach to accounting for inflation. As with the cash flow generation targets discussed above, the selection of the time frame is also important in ensuring that the selected objectives do work for the long-term health of the business.

Risk adjusted returns

7 It is assumed that the use of **risk adjusted returns** relates to the criteria used for investment appraisal, rather than to the performance of the group as a whole. As such, risk adjusted returns cannot be used in defining the top level major **corporate goals**; however they can be one way in which corporate goals are made **congruent** with operating decisions. At the same time, they do provide a **useful input** to the goal setting process in that they focus attention on the company's policy with regard to making risky investments. Once the overall corporate approach to risk has been decided, this can be made effective in operating decisions, for example by **specifying the amount** by which the **cost of capital** is to be **augmented** to allow for risk in various types of investment decisions.

Performance improvement in non-financial areas

8 As discussed in the first section of this report, recent work on corporate objectives suggests that firms should take specific account of those areas which impact only indirectly, if at all, on **financial performance**. The firm has responsibilities towards many groups in addition to the shareholders, including:

(a) **Employees:** to provide good working conditions and remuneration, the opportunity for personal development, outplacement help in the event of redundancy and so on

(b) **Customers:** to provide a product of good and consistent quality, good service and communication, and open and fair commercial practice

(c) **The public:** to ensure responsible disposal of waste products.

9 There are many **other interest groups** that should also be included in the discussion process. Non-financial objectives may often work indirectly to the financial benefit of the firm in the long term, but in the short term they do often appear to compromise the primary financial objectives.

Conclusions

10 It is very difficult to find a comprehensive and appropriate alternative primary financial objective to that of **shareholder wealth maximisation**. However, achievement of this goal can be pursued, at least in part, through the setting of specific **subsidiary targets** in terms of items such as return on investment

and risk adjusted returns. The establishment of non-financial objectives should also be addressed in the context of the overall review of the corporate plan.

Signed: Finance Director

4 **Factors affecting remuneration policy**

(a) **Cost:** the extent to which the package provides value for money.

(b) **Motivation:** the extent to which the package motivates employees both to stay with the company and to work to their full potential.

(c) **Fiscal effects:** government tax incentives may promote different types of pay. At present there are tax benefits in offering some types of share option schemes. At times of wage control and high taxation this can act as an incentive to make the 'perks' a more significant part of the package.

(d) **Goal congruence:** the extent to which the package encourages employees to work in such a way as to achieve the objectives of the firm - perhaps to maximise rather than to satisfice.

Option (a)

In this context, Option (a) is likely to be **relatively expensive** with no payback to the firm in times of low profitability. It is unlikely to encourage staff to maximise their efforts, although the extent to which it acts as a motivator will depend on the individual psychological make-up of the employees concerned. Many staff prefer this type of package however, since they know where they are financially. In the same way the company is also able to budget accurately for its staff costs.

Option (b)

The costs of this scheme will be **lower**, though not proportionately so, during a time of low profits. The effect on motivation will vary with the **individual** concerned, and will also depend on whether it is an **individual** or a **group performance calculation**. There is a further risk that figures and performance may be manipulated by managers in such a way as to maximise their bonus to the detriment of the overall longer term company benefit.

Option (c)

A share option scheme (Option (c)) carries **fiscal benefits** in the same way as the performance related pay above. It also **minimises the cost to the firm** since this is effectively borne by the existing shareholders through the dilution of their holdings. Depending on how pricing is determined, it may assist in **achieving goal congruence**. However, since the share price depends on many factors which are external to the firm, it is possible for the scheme to operate in a way which is unrelated to the individual's performance. Thus such a scheme is **unlikely to motivate directly** through links with performance. Staff will continue to obtain the vast majority of their income from salary and perks and are thus likely to be more concerned with maximising these elements of their income than with working to raise the share price.

CHAPTER 2

Investment appraisal

Introduction

Learning objectives

Tick off

- To explain the decision-making process ☐
- To select and justify investment appraisal techniques ☐
- To choose appropriate values for use in investment appraisal ☐
- To take account of tax and inflation ☐
- To recommend and justify a course of action based on the results of investment appraisal ☐
- To consider relevant non-financial factors, including the limitations of the techniques ☐

The syllabus references relevant to this chapter are 1j, 3a, b, d, g.

Syllabus links

This chapter develops the basic investment appraisal decisions introduced at knowledge level Management Information. The strategic context of these decisions is taken further in Business Strategy. The underlying techniques will be applied in exploring valuation methods in the Advanced level paper Business Change.

Examination context

In the examination you may be asked to set out the relevant cash flows of a decision, including tax and inflation effects, decide whether or not to make an investment, and to discuss the financial and non-financial issues surrounding it.

1 Ranking of investment appraisal techniques

Section overview

- Financial management progresses the skills from knowledge level into application level in the area of investment appraisal.
- Relative merits and demerits mean that discounted cash flow (DCF) techniques such as NPV and IRR are superior.

1.1 Recap of investment appraisal techniques

Investment appraisal was introduced at knowledge level in the Management Information paper. These techniques are taken further in this subject where they are applied to more involved scenarios. This allows for a progression of skills from knowledge into application.

Summary of techniques	
Payback	The time taken for cash inflows from a project to equal the cash outflows.
Accounting rate of return	ARR = $\frac{\text{Average annual profit from investment}}{\text{Initial investment}} \times 100$ or $\frac{\text{Average annual profit from investment}}{\text{Average investment}} \times 100$ where average investment = $\frac{\text{Initial outlay} + \text{Scrap value}}{2}$ **Note**: profit is *after* depreciation
Net present value	The maximum an investor would pay for a given set of cash flows (at his/her cost of capital) compared to the actual amount he/she is being asked to pay. The difference, the NPV, represents the change in wealth of the investor as a result of investing in the project.
Internal rate of return	A cost of capital at which the NPV of a project would be CU0. IRR is usually found via interpolation using two discount rates. IRR = a + $\frac{NPVa}{NPVa - NPVb}$ (b-a) Where a is the first discount rate giving NPVa b is the second discount rate giving NPVb

Interactive question 1: Revision of basic techniques [Difficulty level: Easy]

A company is considering expanding its business. The expansion will cost CU350,000 initially for the premises and a further CU150,000 to refurbish the premises with new equipment. Cash flow projections from the project show the following cashflows over the next six years.

Year	*Net cash flows*
	CU
1	70,000
2	70,000
3	80,000
4	100,000
5	100,000
6	120,000

The equipment will be depreciated to a zero resale value over the same period and, after the sixth year, it is expected that the new business could be sold for CU350,000.

Requirements

Calculate

(a) The payback period for the project

(b) The ARR (using the average investment method)

(c) The NPV of the project. Assume the relevant cost of capital is 12%

(d) The IRR of the project

See **Answer** at the end of this chapter.

There are four basic investment appraisal techniques that are used in practice by companies. The reason why some are used more than others is because of their relative merits and demerits.

Interactive question 2: Ranking of techniques [Difficulty level: Easy]

What are the relative merits and demerits of the following investment appraisal techniques and what conclusion would you therefore draw about their relative attractiveness?

	Merits	Demerits	Rank
Payback			
Accounting rate of return			
Net present value			
Internal rate of return			

See **Answer** at the end of this chapter.

2 Relevant cash flows

Section overview

- Cash flows should be used in investment appraisal rather than profits as this more closely reflects the impact on shareholders' wealth.
- Relevant cash flows are those which are affected by the decision.
- Opportunity costs reflect the cash forgone as a consequence of using resources.

2.1 Why cash flows rather than profits?

When a firm makes a long-term investment in a project, rarely does the profit in any year of the project's life equal the cash flow. For example, in cash flow terms the purchase of plant and equipment may be represented by an outflow at the start of the first year (ie the purchase) and an inflow at the end of the last year (ie the scrap value). In the annual income statements in between, what appears is the difference between the initial cost and the scrap value, ie depreciation, which is *not* a cash flow.

In addition, profit measurement is concerned with the time period in which income and expenses are recognised. Thus, while the income statements might show CU100,000 for sales, the actual cash receipts may be much less as some cash is still to be received, ie there are receivables. This increase in receivables represents a further 'investment' in the project.

From a wealth point of view shareholders will be interested in when cash goes out and when it is returned to them in the form of dividends, ie the amount and timing of the flows are important to them.

Over the life of a project the undiscounted net flows will equal the total accounting profit/loss but (because of the above) the timing will be different.

It is also important to appreciate that not all cash flows are necessarily relevant. In Management Information the behaviour of costs was introduced. Over a given period some costs are fixed and some variable. Whilst all of the costs for a period will be reflected in the income statement ie they will influence the profit, they may not all be relevant cash flows for a particular decision, eg depreciation.

The section below on relevant cash flows explores this idea further.

2.2 Profits to cash flows

If income statement information is provided, there are two adjustments which should be made to convert to cash flows:

- **Depreciation** – as noted above, depreciation is *not* a cash flow and should be added back where it has been deducted in arriving at profits. The initial outflow and scrap inflow will deal with depreciation at the appropriate time
- **Working capital** – a project may involve not only investment in land, buildings etc but also investment in working capital (inventory + receivables – payables). Increases in net working capital represent an outflow, decreases an inflow.

Worked example: Working capital

Gorgon Ltd expects the following sales from a new project over its three year life:

	CU
t_1	150,000
t_2	175,000
t_3	200,000

Working capital equal to 10% of annual sales is required and it needs to be in place at the start of each year.

Calculate the working capital flows.

Solution

First, calculate the *absolute* amounts of working capital needed at the start of each year and then find the cash flows.

	t_0	t_1	t_2	t_3
	CU	CU	CU	CU
Working capital at start	15,000	17,500	20,000	Nil
Cashflow	(15,000)	(2,500)	(2,500)	20,000

Only the incremental flow is relevant, so for example at t_1 an additional CU2,500 is required over and above the CU15,000 already in place.

At the end of the project all working capital is assumed to be recovered, ie an inflow of CU20,000 at t_3.

Interactive question 3: Changing working capital [Difficulty level: Easy]

A company plans to make sales of CU100,000 at t_1, increasing by 10% per annum until t_4. Working capital equal to 15% of annual sales is required at the start of each year.

Requirement

What are the working capital cash flows?

See **Answer** at the end of this chapter.

2.3 Relevant cash flows

The general rule is to include only those costs and revenues which can affect the decision or be affected by it. This means using only *future incremental cash flows.* Future flows are used as no decision now can change past cash flows; incremental, ie changed, cash flows are used because flows which continue into the future regardless of the decision are irrelevant to the decision.

Definition

The **relevant cash flows** are future, incremental, cash flows arising from the decision being made.

The relevant cash flow is the difference between:

- The cash flow if the course of action is taken, and
- The cash flow if it is not

The assessment of relevant cash flows needs to be done from the point of view of the business as a whole and not individual divisions or departments.

Typical items which are *excluded* from the analysis as irrelevant are discussed below:

- **Sunk costs** – money already spent, eg when trying to determine whether an existing machine which cost CU250,000 three years ago should be used on a new project, the analysis should ignore the CU250,000 as nothing can be done about it; instead, the machine's current worth (either scrap value or cash benefits from retention) should be included
- **Accounting entries** – eg depreciation (as discussed above) is not a cash flow
- **Book values** – eg FIFO/LIFO inventory values. This is similar to sunk costs above as the FIFO/LIFO conventions merely deal with the treatment of money *already spent*
- **Unavoidable costs** – money already committed, eg a non-cancellable lease or *apportioned* fixed costs. As far as fixed costs are concerned it is the total amount which is important (not any attempt to spread the fixed cost, ie apportionment). If the *total* changes, then this is relevant; if not, the fixed costs are ignored as they are unaffected by the decision. For example, if a firm can make a new product within its existing rented factory, then any share of the rent apportioned to the new product should be ignored as the *total* rent bill is unchanged. However, if a new factory needs to be rented, then the *additional* rent is relevant in the appraisal of the new product
- **Finance costs** – eg interest (discounting deals with this by finding the present value of the flows allowing for the time the finance is tied up and the interest rate)

Specifically *include*:

- All opportunity costs and revenues.

2.4 Opportunity costs and revenues

Definition

The **opportunity cost** of a resource may be defined as the cash flow forgone if a unit of the resource is used on the project instead of in the best alternative way.

If there are scarcities of resources to be used on projects (eg labour, materials, machines), then consideration must be given to revenues which could have been earned from alternative uses of the resources.

- Shareholders are concerned with the flows generated by the whole organisation in terms of assessing their impact on their wealth
- The cash flows of a single department or division cannot therefore be looked at in isolation. It is always the cash flows of the whole organisation which must be considered
- **For example**, the skilled labour which is needed on the new project might have to be withdrawn from normal production causing a loss in contribution. This is obviously relevant to the project appraisal

Worked example: Relevant cost of material

A new contract requires the use of 50 tonnes of metal ZX 81. This metal is used regularly on all the firm's projects. At the moment there are in inventory 100 tonnes of ZX 81, which were bought for CU200 per tonne. The current purchase price is CU210 per tonne, and the metal could be disposed of for net scrap proceeds of CU150 per tonne.

With what cost should the new contract be charged for the ZX 81?

Solution

The use of the material in inventory for the new contract means that more ZX 81 must be bought for normal workings. The cost to the organisation is therefore the money spent on purchase, no matter whether existing inventory or new inventory is used on the contract.

Assuming that the additional purchases are made in the near future, the relevant cost to the organisation is current purchase price, ie 50 tonnes × CU210 = CU10,500.

Interactive question 4: Material with no alternative use [Difficulty level: Intermediate]

Suppose the organisation has no alternative use for the ZX 81 in inventory.

What is the relevant cost of using it on the new contract?

See **Answer** at the end of this chapter.

Interactive question 5: Material with a scrap value [Difficulty level: Intermediate]

Suppose again there is no alternative use for the ZX 81 other than a scrap sale, but that there are only 25 tonnes in inventory.

See **Answer** at the end of this chapter.

Worked example: Relevant cost of labour

A mining operation uses skilled labour costing CU8 per hour, which generates a contribution of CU6 per hour, after deducting these labour costs.

A new project is now being considered which requires 5,000 hours of skilled labour. There is a shortage of the required labour. Any used on the new project must be transferred from normal working.

What is the relevant cost of using the skilled labour on the project?

Solution

What is lost if the labour is transferred from normal working?

	CU
Contribution per hour lost from normal working	6
Labour cost per hour which is not saved	8
Cash lost per hour as a result of the labour transfer	14
The contract should be charged with 5,000 × CU14	CU70,000

Interactive question 6: Relevant cost of surplus labour [Difficulty level: Easy]

Facts as in the previous Worked example, but there is a surplus of skilled labour sufficient to cope with the new project. The idle workers are being paid full wages.

See **Answer** at the end of this chapter.

Interactive question 7: Relevant costs [Difficulty level: Intermediate]

A research project, which to date has cost the company CU150,000, is under review.

If the project is allowed to proceed it will be completed in approximately one year, when the results are to be sold to a government agency for CU300,000.

Shown below are the additional expenses which the managing director estimates will be necessary to complete the work:

Materials. This material has just been purchased at a cost of CU60,000. It is toxic; if not used in this project, it must be disposed of at a cost of CU5,000.

Labour. Skilled labour is hard to recruit. The workers concerned were transferred to the project from a production department, and at a recent meeting the production manager claimed that if these people were returned to him they could generate sales of CU150,000 in the next year. The prime cost of these sales would be CU100,000, including CU40,000 for the labour cost itself. The overhead absorbed into this production would amount to CU20,000.

Research staff. It has already been decided that, when work on this project ceases, the research department will be closed. Research wages for the year are CU60,000, and redundancy and severance pay has been estimated at CU15,000 now, or CU35,000 in one year's time.

Equipment. The project utilises a special microscope which cost CU18,000 three years ago. It has a residual value of CU3,000 in another two years and a current disposal value of CU8,000. If used in the project it is estimated that the disposal value in one year's time will be CU6,000.

Share of general building services. The project is charged with CU35,000 per annum to cover general building expenses. Immediately the project is discontinued, the space occupied could be sub-let for an annual rental of CU7,000.

Requirement

Advise the managing director as to whether the project should be allowed to proceed, explaining the reasons for the treatment of each item.

(**Note:** Ignore the time value of money.)

See **Answer** at the end of this chapter.

2.5 Deprival value

- When an asset which is currently owned by the business is required for another specific contract/project, the existing activity is to be deprived of that asset. The value to be used in the investment appraisal is, therefore, the asset's deprival value.

Worked example: Deprival value

A company has a printing press which needs to be used on a new contract.

The press could be sold for CU1,000 or made use of to service the needs of existing customers for business which has a value (in present value terms) of CU1,500.

Requirements

(a) What is the opportunity cost of using the machine on a new contract?

(b) If the printing press could be replaced at a cost of either

(i) CU800

(ii) CU1,800

What would the relevant cost be?

Solution

(a) The existing customers create more value than selling the machine, so the machine would not be sold.

Hence the opportunity cost is the value in use of CU1,500

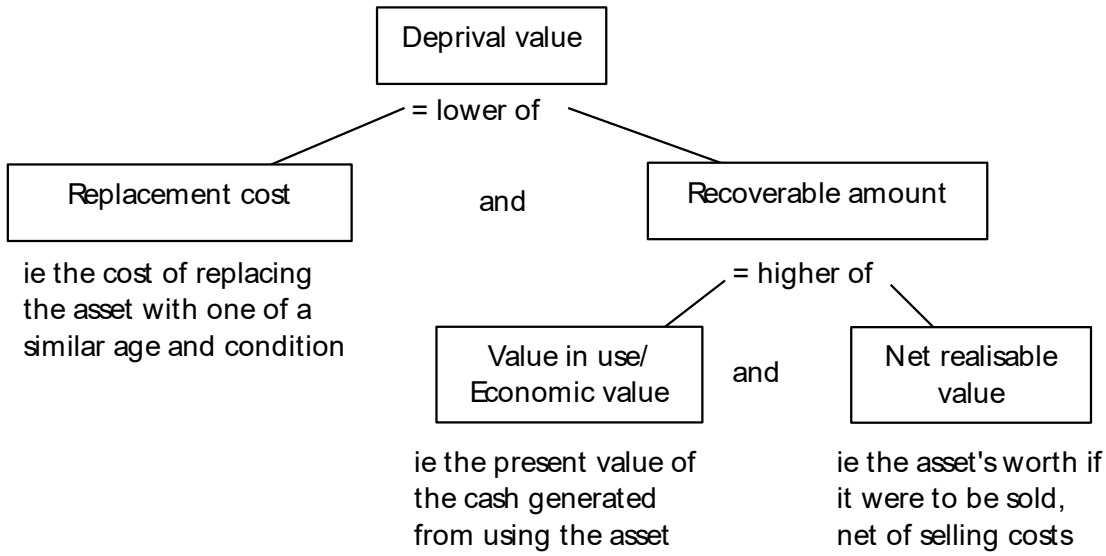
Note: if the value in use ever dropped below the net realisable value (NRV), then the asset would not be worth keeping.

(b) (i) If the new contract will make use of a currently owned machine then in principle the cost of using it will be the replacement cost. If the value in use is CU1,500, and the replacement cost is CU800, then the machine will be replaced. The equipment cost of the new contract would therefore be CU800.

(ii) If however, the replacement cost is CU1,800 then it is not worth replacing. Thus the relevant cost of equipment for the new contract will be the opportunity cost or benefit forgone – ie the CU1,500.

In each case therefore the relevant cost is the cash flow effect of the decision to use the existing resource – either the replacement cost or the benefit in the next best case, ie the deprival value.

This can be summarised as follows.



- If the asset has a net realisable value in excess of its economic value it should be sold, ie it is better to discontinue using it. If the economic value is higher than the net realisable value it is worth keeping and using. At this point, therefore, were the firm to be deprived of the asset, the best alternative forgone is the higher of the net realisable value or economic value (the 'recoverable amount')

- However, if the recoverable amount is less than the replacement cost, then the recoverable amount is the deprival value, ie the asset would not be replaced were the firm to be deprived of its use. If the recoverable amount exceeds the replacement cost, the asset should be replaced as the latter represents its deprival value

Interactive question 8: Deprival value

[Difficulty level: Intermediate]

Joe's car is not insured against theft.

He bought it two years ago for CU2,000. A similar vehicle would now cost CU1,000. He believes he could sell the vehicle for CU1,000 after spending CU100 on advertising. The vehicle has two years of life remaining, and over this period he believes it will save him taxi fares with a present value of CU800.

Requirement

What is the loss to Joe if his car is stolen?

See **Answer** at the end of this chapter.

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3 Taxation

Section overview

- Taxable profit and accounting profit may not be the same.
- Tax is charged on net cash flow.
- Capital allowances reduce the tax payable.

3.1 Basics

Income statement

Imagine an income statement drawn up at the end of the first year of a project's life *using normal financial accounting principles*:

Worked example: Taxable profit

	CU	CU
Sales		10,000
Materials	1,000	
Labour	1,500	
Variable overheads	500	
Fixed overheads		
Depreciation	1,000	
Other	500	
		(4,500)
		5,500
Interest on loan to finance project		(3,000)
Profit		2,500

Requirement

In calculating the taxable profit for investment appraisal purposes, what are the relevant cash flows to be considered?

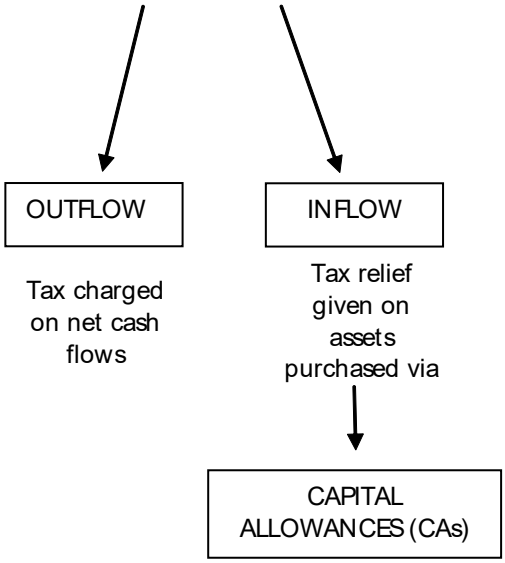
Solution

Corporation tax for year 1 of the project is not simply CU2,500 times the tax rate. Some adjustments need to be made to the profit calculation before computing the tax charge:

- Only incremental relevant cash flows need be considered (as covered in section 2 above) and the incremental tax charge. Thus some of the above costs – eg fixed costs, may not be relevant and therefore the tax effect of these is not relevant
- Depreciation should be ignored (it is not allowed as a deduction from profits when calculating the tax – see below)
- Interest should be ignored. The tax effect of interest is incorporated into the cost of capital

3.2 Effects

Taxation has two effects in investment appraisal, both giving rise to relevant cash flows.



3.3 Capital allowances (CAs)

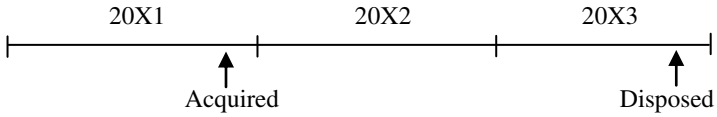
- This is National Board of Revenue (NBR) version of depreciation. For the purposes of the examination, only CAs on plant and equipment are considered (though in practice there are other categories of non-current assets that attract CAs).
- **Unless otherwise stated**:
  - Calculate writing down allowances (WDAs) at 18% on a reducing balance basis
  - There is no WDA in the year of sale; a balancing allowance/charge is calculated instead. The balancing allowance relieves any unrelieved expenditure; the balancing charge claws back any excess relief given – assume that there are sufficient profits available elsewhere in the business to utilise all tax benefits in full and at once.

3.4 Other assumptions

- Although large companies make tax payments in four equal instalments during the accounting year, *for examination purposes the whole tax payment is assumed to be made at the end of the year to which it relates*
- For this study manual purposes ***unless otherwise stated*** corporation tax is assumed to be *paid at 21%* (although other rates are possible in the real world)
- The tax rate can be assumed to be *constant* over the life of the project (unlikely in practice)
- It should be assumed that working capital flows have *no* tax effects

Worked example: Capital allowances

Happy Ltd bought a machine for CU10,000 on 31 December 20X1, its accounting year end. The asset generated cash flows of CU7,000 pa. It sold the asset on 31 December 20X3 for CU2,000.



The company pays tax at 21%. Capital allowances are available at 18% on a reducing balance basis.

Show the WDAs and any balancing charge or allowance.

Solution

Year ended 31 Dec Tax WDV (WDV = written down value)

	CU	
20X1	10,000	
WDA @ 18%	(1,800)	Asset owned at end of each of 20X1 and 20X2. ∴ 18% WDA calculated
20X2	8,200	
WDA @ 18%	(1,476)	
20X3	6,724	In 20X3 asset sold. As proceeds (in this case) are less than WDV a balancing allowance is given.
Proceeds	(2,000)	
Balancing allowance	4,724	

Total reliefs = CU(1,800 + 1,476 + 4,724) = CU8,000 (= cost – scrap). Tax payments, cash flows etc can then be shown as follows:

Tax computation

	31 Dec 20X1	*31 Dec 20X2*	*31 Dec 20X3*
	CU	CU	CU
Net inflows		7,000	7,000
WDA/Balancing allowance	(1,800)	(1,476)	(4,724)
Taxable	(1,800)	5,524	2,276
Tax @ 21%	378*	(1,160)	(478)

* Tax saved, assuming sufficient profits exist elsewhere in the business to obtain relief from WDA as soon as possible (section 3.3 above).

Normally the tax effect is shown as two separate elements:

	31 Dec 20X1	*31 Dec 20X2*	*31 Dec 20X3*
	CU	CU	CU
Net inflows		7,000	7,000
(1) Tax paid @ 21%		(1,470)	(1,470)
WDAs/Balancing allowance	(1,800)	(1,476)	(4,724)
(2) Tax saved @ 21%*	378	310	992
Total tax (above) (1) + (2)	378	(1,160)	(478)

* ie being able to *deduct* the WDA from profit *saves* tax @ 21%.

The NPV calculation would show (rounding to the nearest CU):

	31 Dec 20X1	*31 Dec 20X2*	*31 Dec 20X3*
	CU	CU	CU
Net inflows		7,000	7,000
Tax		(1,470)	(1,470)
Asset purchase	(10,000)		
Scrap			2,000
Tax saved on WDAs	378	310	992
Net CF for discounting	(9,622)	5,840	8,522

Interactive question 9: Capital allowances

[Difficulty level: Intermediate]

1 A company buys an asset for CU10,000 at the end of its accounting period, 31 December 20X0, to undertake a two year project.

2 Net trading inflows at t_1 and t_2 are CU5,000.

3 The asset has a CU6,900 scrap value when it is disposed of at the end of year 2.

4 Tax is charged at 21%. WDAs are available at 18% pa.

Requirement

Calculate the net cash flows for the project.

See **Answer** at the end of this chapter.

Interactive question 10: Timing issues [Difficulty level: Intermediate]

As in Interactive question 9, except that the asset is now bought on 1 January 20X1.

Requirement

Calculate the net cash flows for the project.

See **Answer** at the end of this chapter.

4 Inflation

Section overview

- Inflation rate can be incorporated into both cash flow and discount rate ('money @ money').
- Inflation can be ignored in both cash flows and discount rate ('real @ real').

Inflation Rate in Bangladesh averaged 6.63 percent from 1994 until 2016, reaching an all-time high of 16.00 percent in September of 2011 and a record low of -0.03 percent in December of 1996. Consumer prices in Bangladesh increased 5.38 percent year-on-year in November of 2016, following 5.57 percent growth in the previous month. As inflation will continue to exist in the future, account needs to be taken of its effects, ie increases in prices, when appraising projects. It creates two problems in investment appraisal:

- Estimating future cash flows – the rate of inflation must be taken into account
- The rate of return required by shareholders and lenders will increase as inflation rises – the discount rate is therefore affected

4.1 Real and money (or nominal) rates

- The rates of interest that would be required in the absence of inflation in the economy are referred to as the real rates of interest
- When real rates of interest are adjusted for the effect of *general* inflation, measured by the consumer prices index (CPI), the results are referred to as money (or nominal) rates of interest

Worked example: Impact of inflation

Kuman is considering a choice. He can spend CU100 on consumables now or he can invest it for a year, but will only do so if he can consume more of it at that time.

The underlying time value of money for Kuman is 10%, and inflation is 5%.

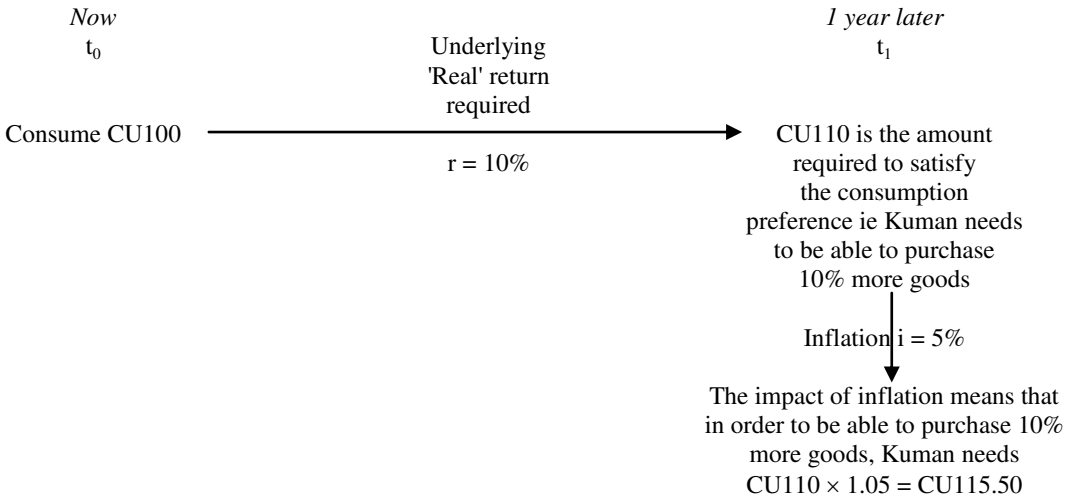
Requirement

What return in money terms does Kuman require?

Solution

The total return must compensate Kuman for his consumption preference ie the fact that he would prefer to consume now. He must therefore earn 10% to reflect his time value of money. In addition, the rate must compensate Kuman for the fact that prices are rising by 5% pa.

This can be illustrated as follows.



In order to be satisfied with not consuming now, Kuman needs CU115.50 of **money** in a year

CU100 × (1.10)(1.05) = CU115.50

Overall money return (m) required = $\frac{£^{cu}115.50}{£^{cu}100} = 15.5\%$

Money rates, real rates and general inflation (CPI) are linked by the following:

$(1 + m) = (1 + r)(1 + i)$

where m = money rate
r = real rate
i = general inflation

Thus in the example above

$(1 + m) = (1.10)(1.05) = 1.155$
$m = 15.5\%$

4.2 Money and current cash flows

As examination questions are normally answered using the money method (see section 4.4 below) it is vital to determine whether the cash flows are given in money or current terms.

- Money (or nominal) cash flows are cash flows where any inflationary effects have *already* been taken into account
- Current cash flows are cash flows expressed in *today's* terms which will be affected by inflation in the future and have *not* yet been adjusted

4.3 General and specific inflation rates

It is also important in examination questions to determine what sort of inflation rate is applicable to the items in the question.

- A general inflation rate is a weighted average of many specific inflation rates, eg CPI, and is normally applied to the real rate in order to derive the money rate (section 4.1 above)

- A specific inflation rate is the rate of inflation on an individual item or service, eg the rate at which labour costs per hour will increase
- Examples:

Individual item	*Specific inflation*	
Bread	1% pa	CPI is a weighted average of these rates
Milk	3% pa	
Cheese	2% pa	
etc.		

- Economic forecasters will regularly publish estimates of general inflation. Estimating individual rates is much more difficult, and decision makers should recognise that they are just that – estimates, and subject to a degree of error

4.4 Discounting

Money method ('money @ money')

It is essential to match like with like when performing NPV calculations. In the real world money flows are the easiest to deal with as they are the everyday flows people are used to. So to use the money method:

- Adjust the individual cash flows, eg sales/revenue, materials, labour using their specific inflation rates to convert to money cash flows, ie the flows which will actually occur
- Discount these money flows using the money rate, ie the rate of interest which will actually occur.

This is the simplest technique. Use wherever possible unless a question directs otherwise.

Real method ('real @ real')

An alternative way of reaching the *same* NPV and again matching like with like, is to use the real method. The problem with this method is that real cash flows and interest rates are not directly identifiable in the way that money flows and rates are. For example, banks regularly publish money interest rates on savings accounts, overdrafts, etc. The unpublished real rate needs to be derived by stripping out the general inflation used to determine the money rate (as in section 4.1 above). So to use the real method:

- Remove the effects of *general* inflation from money cash flows to generate real cash flows
- Discount using real rate.

Although this achieves the same NPV as the money method, it is often very long winded and would only be useful in a question where the real flows and interest rate were *already given*.

Interactive question 11: Money @ money

[Difficulty level: Intermediate]

Project Invest CU10,000 at t_0 in new plant and equipment
Returns CU5,000 pa in current terms for three years, inflating at 7% pa
Money rate of interest is 10%

Requirement

Calculate the project's NPV using the money method.

See **Answer** at the end of this chapter.

Effective method

- This method can sometimes be a short cut for the money method, eg for long projects with annuity or perpetuity cash flows
- To use the effective method leave cash flows in current (t_0) terms and adjust the discount rate as shown below to incorporate both inflating and discounting
- Discount current terms cash flows using effective rate (e):

$$1 + e = \frac{1+m}{1+i_s}$$

where i_s = inflation specific to given cash flow

Interactive question 12: Effective rate

[Difficulty level: Intermediate]

Labour costs inflate at 8% pa in perpetuity
Money rate = 10%
Labour currently costs CU10,000 in t_0 terms

Requirement

Calculate the present value of labour costs.

See **Answer** at the end of this chapter.

4.5 Practical considerations

- General inflation may not be constant, thus the money discount rate may vary year on year. In order to discount cash flows with a different money interest rate in each year, the money @ money approach discussed above should be used
- The impact of inflation is more significant for longer periods as the increase in prices is compounded year on year. However, as noted earlier, the further into the future the more difficult it is to estimate specific inflation rates, so errors in estimates will be compounded

4.6 NPV proforma

The following proforma summarises the topics dealt with so far and provides a layout for NPV calculations useful in 95%+ of situations:

	t0	t1	t2	t3
	CU	CU	CU	CU
Operating cash flows				
Adjust for inflation } Sales/revenue		X	X	X
Include only relevant cash flows } Costs		(X)	(X)	(X)
Net		X	X	X
Tax		(X)	(X)	(X)
Asset				
Purchase	(X)			
Scrap				X
Tax on WDAs	X	X	X	X
Working capital	(X)	(X)	(X)	X
Net flows	(X)	X	X	X
* Discount factor	1	X	X	X
PV of cash flows	(X)	X	X	X
∑PV = NPV				

* Use discount factors for the after-tax cost of capital

5 Replacement analysis

Section overview

- The optimal replacement cycle is the one with the lowest equivalent annual cost.
- The analysis assumes the replacement decision will apply indefinitely.

- So far it has been assumed that investment in an asset is a one-off decision. However, a project is likely to involve commitment to long-term production, and machinery will therefore need to be replaced
- A business needs to know how often to replace such assets. Replacing after a long time means not replacing as often, so delaying the cost of a new replacement machine. However this invariably means keeping an asset whose value is declining and which costs more to maintain. These costs and benefits need to be balanced

Worked example: Replacement decision

A decision has to be made on replacement policy for vans. A van costs CU12,000. Vans can be replaced after 1,2, or 3 years. The following additional information applies:

Interval between replacement (years)	*Trade-in allowance* CU	*Age at Year end* (years)	*Maintenance cost paid at end of year* CU
1	9,000	Year of replacement	Nil
2	7,500	1	2,000
3	7,000	2	3,000

Calculate the optimal replacement policy at a cost of capital of 15%. There are no maintenance costs if the van is replaced after one year. Ignore taxation and inflation.

Solution

NPVs

1 year cycle $\quad NPV = (12{,}000) + \frac{9{,}000}{1.15} = CU(4{,}174)$

2 year cycle $\quad NPV = (12{,}000) + \frac{(2{,}000)}{1.15} + \frac{7{,}500}{1.15^2} = CU(8{,}068)$

3 year cycle $\quad NPV = (12{,}000) + \frac{(2{,}000)}{1.15} + \frac{(3{,}000)}{1.15^2} + \frac{7{,}000}{1.15^3} = CU(11{,}405)$

These costs are not comparable, because they refer to different time periods. The reason the one year cycle appears cheaper is because it only reflects the cost of having a machine for one year, whereas the CU11,405 for the 3 year cycle is the cost to the business of keeping the resource for three years. There are two possible approaches to making the costs comparable.

5.1 Lowest common multiple approach

One method of comparing the different replacement options is to evaluate the costs over a time frame which makes them consistent.

In the above example, this will be achieved if the costs incurred **under each cycle** were compared over the same number of years for each.

For example:

Time	*1 Year cycle* CU'000	*2 Year cycle* CU'000	*3 Year cycle* CU'000
0	(12)	(12)	(12)

1	9 + (12)	(2)	(2)
2	9 + (12)	7.5 + (12)	(3)
3	9 + (12)	(2)	7 + (12)
4	9 + (12)	7.5 + (12)	(2)
5	9 + (12)	(2)	(3)
6	9	7.5	7

In order to be comparable, the analysis has to be continued for six years (the lowest common multiple of the asset lives). Stopping before this means one of the options would be part way through a cycle. At the end of six years is the earliest occasion that all three cycles come to an end at the same time (ie a new van is required under each cycle). The lowest common multiple approach will give a solution, but is rather long winded. The Equivalent Annual Cost approach is a better method, and is discussed below.

5.2 Equivalent annual cost (EAC)

In Management Information, the method for finding the present value of an annuity was introduced.

PV of an annuity = Annuity × Annuity Factor (AF) for n periods at a discount rate r

This can be applied here to restate the present value of the costs over a life cycle into an annuity – the equivalent annual cost – over the life cycle, as follows:

The NPVs calculated above are converted into equivalent annual costs, ie the equivalent constant annual sum payable at the end of each year for any given cycle.

The equivalent annual costs *can* be compared.

1 year cycle (4,174) = X × AF 1 year @ 15%

(4,174) = X × 0.870

X = CU(4,798)

2 year cycle (8,068) = X × AF 2 years @ 15%

(8,068) = X × 1.626

X = CU(4,962)

3 year cycle (11,405) = X × AF 3 years @ 15%

(11,405) = X × 2.283

X = CU(4,996)

Thus it is cheapest to replace the vans every year, because this cycle has the lowest cost in NPV terms.

So the method can be summarised as:

1 Calculate the NPV of each replacement strategy

2 Calculate the annual equivalent cost of the NPV for each strategy

3 Choose the strategy with the lowest annual equivalent cost.

Interactive question 13: Replacement cycle [Difficulty level: Intermediate]

A machine costs CU20,000 and it can be replaced every year or every two years. Delaying the replacement causes the running costs to increase and the scrap proceeds to decrease as follows:

	Running costs	*Scrap proceeds*
	CU	CU
Year 1	5,000	16,000
Year 2	5,500	13,000

Company's cost of capital = 10%.

Requirement

Should the machine be replaced every one or every two years?

See **Answer** at the end of this chapter.

5.3 Limitations of the replacement analysis performed

This method assumes that a firm is continually replacing like with like, and therefore determines a once-and-for-all optimal replacement cycle. In practice this is unlikely to be valid due to:

- Changing technology, which can quickly make machines obsolete and shorten replacement cycles. This means that one asset is not being replaced by one exactly similar
- Inflation, which by altering the cost structure of assets means that the optimal replacement cycle can vary over time
- If inflation affects all variables equally it is best excluded from the analysis by discounting real cash flows at a real interest rate – the optimal replacement cycle will remain valid
- Differential inflation rates mean that the optimal replacement cycle varies over time
- The effects of taxation (ignored in the analysis but they could be incorporated)
- The fact that production is unlikely to continue in perpetuity

6 Capital rationing

Section overview

- Scarce capital means that projects have to be ranked according to how efficiently they use the limiting factor.
- Divisible projects are ranked using NPV per CU of scarce capital.
- Indivisible projects are ranked using trial and error by finding the combination of projects that maximises NPV.

Definition

Capital rationing is the situation where insufficient funds exist to undertake all positive NPV projects, so a choice must be made between projects.

6.1 Two types of rationing

- Hard rationing: where the external capital market (banks, stock exchange, etc) limit the supply of funds
- Soft rationing: where internally the firm imposes its own constraint on the amount of funds raised. This may be as a surrogate for other constraints, eg insufficient managerial capacity to handle all positive NPV projects

  Soft rationing may also arise where it is impractical for the firm to go to the market and raise a small amount of finance, and where raising the funds in large amounts is more practical and cost effective.

6.2 Single period rationing

When funds are scarce in one year only, but freely available otherwise, the basic NPV approach to project selection is modified.

Projects are ranked by NPV per CU capital outlay in the rationed period. (This can be referred to as the 'profitability index'.) This is an extension of key factor analysis covered at the knowledge level of the professional stage examinations.

The situation where funds are rationed in more than one time period (multi-period capital rationing) is beyond the syllabus.

Interactive question 14: Capital rationing

[Difficulty level: Intermediate]

A business has CU50,000 available at t_0 for investment.

Four divisible projects are available:

Project	*NPV*	*Funds required at t_0*
	CU	CU
A	100,000	(50,000)
B	(50,000)	(10,000)
C	84,000	(10,000)
D	45,000	(15,000)

Requirement

Which project(s) should be undertaken?

See **Answer** at the end of this chapter.

6.3 Indivisible projects

The solution to Interactive question 14 assumes it is possible to accept half of project A, ie that projects are perfectly divisible so half the outlay gives half the NPV, etc.

In reality projects may be indivisible, ie all or nothing, in which case trial and error is necessary to find the optimal combination.

In Interactive question 14 above, possible combinations are:

	NPV	*Funds*
	CU	CU
A	100,000	50,000
C and D	129,000	25,000

Therefore choose C and D.

6.4 Mutually exclusive projects

It may be the case that projects are mutually exclusive, ie it is not possible to undertake both at the same time, perhaps because management would be overstretched in trying to run both projects.

Imagine that a firm facing single period capital rationing is trying to choose between five projects – P, Q, R, S and T. P and Q are mutually exclusive, ie either P or Q but not both could be undertaken. In order to make the choice it should apply the procedures in sections 6.2 or 6.3 above to two separate groupings

P, R, S, T	Q, R, S, T

and see which produces the higher overall NPV.

6.5 Project synergy

So far projects have been considered independently. It may be the case that by undertaking certain combinations of projects, some synergy (extra NPV) is created, eg from cost savings.

Interactive question 15: Project synergy

[Difficulty level: Intermediate]

A firm has CU100,000 available for investment at t_0.

Three divisible projects are available:

Project	*NPV*	*Funds required at t_0*
	CU	CU
X	25,000	100,000
Y	11,000	50,000
Z	8,000	40,000

If Y and Z were undertaken together an extra CU4,400 of NPV could be earned.

Requirement

Which project(s) should be undertaken?

See **Answer** at the end of this chapter.

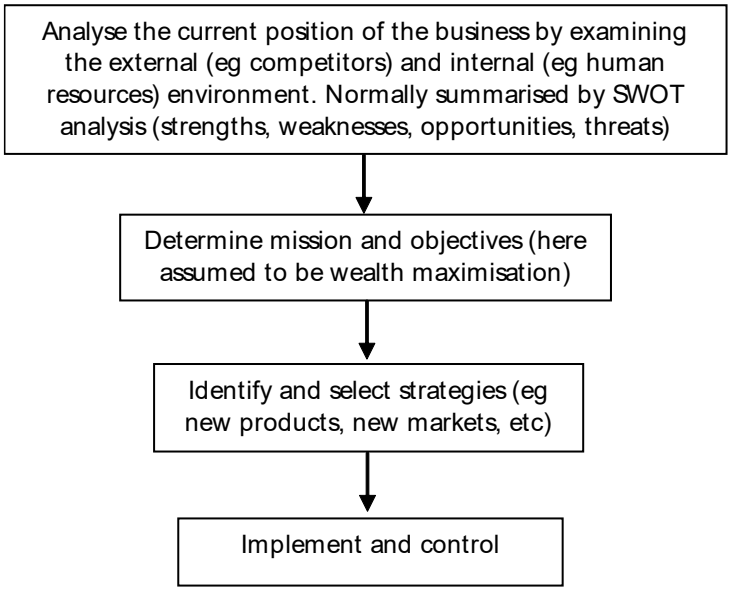
7 Investment appraisal in a strategic context

Section overview

- Investment appraisal needs to be considered in a strategic context
- Shareholder value analysis (SVA) focuses on decisions which maximise shareholder wealth
- Investment may give rise to new opportunities, known as real options.

7.1 Project generation, decision making and control

Investment projects will normally be identified as part of a firm's strategic planning process. This is covered in detail in the Business Strategy paper. In outline the process is as follows:



- Once potential projects are identified, eg replacing an existing product with a new one, the relevant costs and revenues associated with the proposal must be determined. Care must be taken to avoid bias in estimates, eg from managers closely associated with the proposal
- The relevant costs and revenues should be assessed using NPV to determine whether wealth increases. Where there are competing projects, those that offer the best NPV should be chosen (capital rationing may need to be considered at this point)
- Chosen projects are then implemented and performance monitored, eg actual outcomes v budget etc

7.2 Shareholder value analysis

Definition

Shareholder value analysis (SVA) is the process of analysing the activities of a business to identify how they will result in increasing shareholder wealth.

Managers may sometimes be influenced to act in a manner which is inconsistent with maximising shareholder wealth. The claimed advantage of SVA, as a **philosophy** of business decision-making, is that the actions of managers can be directly linked to value generation and the outcomes of decisions can be assessed in that context.

Interactive question 16: SVA

[Difficulty level: Easy]

Explain what possible problems are created when using the following measures to assess management effectiveness.

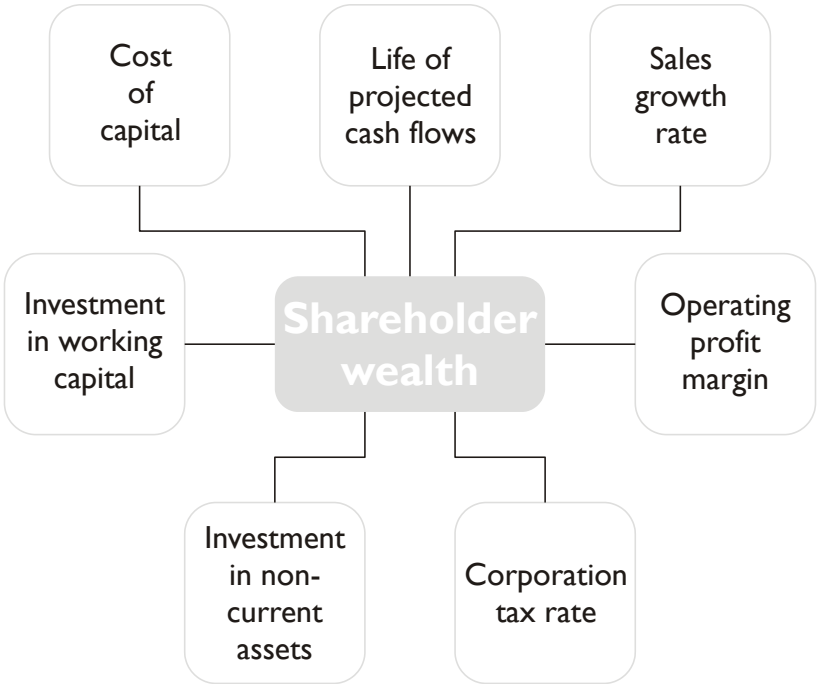
Return on capital employed

Earnings per share

See **Answer** at the end of this chapter.

7.3 The principles of SVA

A business has a particular value at a particular time because of the projected cash flows from its activities. The particular value will be based on their timings and riskiness. According to the philosophy of SVA, the value of the business is affected or 'driven' by just seven factors, known as 'value drivers'. To increase the value of the business, ie to generate additional value, one or more of these seven will need to alter in a favourable direction. The value drivers, and their effect on shareholder value, are shown below.



These seven factors all impact on the operating cash flows and through them the value of the business and the wealth of the shareholders.

These will be examined in turn and related to individual parts of the business.

Sales growth rate	If a greater level of sales can be generated in the future than was expected, this should create more cash flows and, therefore, value. The greater level of sales could come from a new product and, provided that this did not have an adverse effect on one of the other value drivers, greater value would necessarily be created. Similarly, arresting an expected decline in sales levels for some existing product has the potential to generate value.
Operating profit margin	The operating profit margin is the ratio of net profit, before financing charges and tax, to sales. The higher this ratio the more cash flows there are for each sale. Thus if costs can be controlled more effectively, more cash will tend to flow from each sale and value will be enhanced.
Corporation tax rate	This clearly affects cash flows and value because, broadly, tax is levied directly on operating cash flows. Management's ability to affect the tax rate and the amount of tax paid by the business tends, at best, to be marginal.
Investment in non-current assets	Normally cash has to be spent on additional non-current assets in order to enhance shareholder value. Wherever managers can find ways of reducing the outlay on plant etc without limiting the effectiveness of the business, this will tend to enhance shareholder value.
Investment in working capital	Nearly all business activities give rise to a need for working capital: inventories, receivables, payables and cash. Amounts tied up in working capital can be considerable. Steps that can be taken, for example, to encourage trade receivables to pay more quickly than expected, will bring cash flows forward and tend to generate value, as long as the benefits of quicker payment outweigh the cost of delivering it.
Cost of capital	The cost of funds used to finance the activities of the business will typically be a major determinant of shareholder value. So if the business can find alternative, cheaper, sources of long-term finance, value would tend to be enhanced.
Life of projected cash flows	Clearly, the longer that the life of any cash generating activity can continue, the longer its potential to generate value.

7.4 How can SVA be used?

Where SVA is seen to be most useful is in highlighting the key drivers of value. This enables managers to set targets for achieving value enhancing strategies in each area. It can help to create an environment where value enhancement is at the top of the agenda for managers in all areas of the business. In this way the primary financial objective of the business can be achieved. SVA can also be used to value a business (see chapter 8).

7.5 Real options

One problem of NPV analysis is that it only considers cash flows related directly to the project. It is possible that a project with a negative NPV is accepted for 'strategic' reasons. This is because management accept that there are options associated with a particular project which outweigh the conventionally calculated negative NPV.

The revised decision model becomes:

Project worth = Traditional NPV + value of any options

Worked example: Real options

Situation	Real option
Follow on options A firm is considering investing in a project to manufacture microcomputers. The initial NPV is negative.	Launching this project would give a later opportunity to launch a second (and third and so on) version which could be highly profitable or could lose money. Launching the first version effectively gives the right to invest in later versions. The right to invest or buy is known as a call option.
Abandonment options	Both projects offer the right to abandon the project if things

Situation	Real option
A firm is considering investing in two projects, both having the same expected NPV. The first uses a highly specialised machine with little resale value or alternative use. The second involves expenditure mainly on highly marketable land and buildings.	go wrong, by selling the assets. The value of the second option is much greater and could well be preferred by management. The right to sell is known as a put option. Some projects such as those in the natural resource industry (timber, mining etc) have inbuilt options to reduce capacity or suspend operations temporarily.
Timing options A firm has the development rights over a piece of land. The rights can be exercised any time over the next five years.	Projects where commencement can be delayed are often attractive. In a volatile market a project that can be delayed is like a call option with a long period of expiry. If the company can delay investment it can wait and see what happens to the market before investing or not (exercising the option or not). The longer the delay, the more valuable the option. The option to delay is only valuable if it offsets any loss from delaying eg delaying results in a competitor establishing a loyal customer base that makes it difficult for the company to enter later. Patents and other barriers to entry can offer some protection against this.
Growth options New technology, deregulation etc present uncertain growth opportunities for firms – investing could produce substantial losses.	Choices might include • Full investment and hope it pays off (high risk) • Wait and see but competitors might take a lead • Acquire 'growth option' Growth options include • Start with small capacity, expanding later if market conditions are good • Joint ventures and strategic alliances as entry strategies into emerging markets, eg China • R&D avoiding 'wait and see' risk and, if prospects look poor, no full investment, eg pharmaceutical companies • Follow on options noted above
Flexibility options A power station could be constructed to generate electricity using only gas as the input fuel. Whilst this might be the cheapest option it lacks flexibility in the face of volatile gas prices.	A more expensive station capable of using gas or coal or oil gives greater flexibility. This flexibility option has a value which must be included in the evaluation.

The above refers to options associated with investments – so called 'real' options. Chapters 9 and 10 will introduce how options to buy and sell currency, shares, bonds, etc can be used to manage risks such as interest rates and exchange rates.

8 Investing overseas

Section overview

- Overseas investment carries additional risks, including political and cultural.
- The methods of financing overseas subsidiaries will depend on the length of investment period envisaged,

also the local finance costs, taxation systems and restrictions on dividend remittances.

When deciding what types of country a company should enter (in terms of environmental factors, economic development, language used, cultural similarities and so on), the major criteria for this decision should be as follows.

(a) Market attractiveness. This concerns such indicators as GNP/head and forecast demand.

(b) Competitive advantage. This is principally dependent on prior experience in similar markets and having a cultural understanding.

(c) Risk. This involves an analysis of political stability, the possibility of government intervention and similar external influences.

8.1 Political risks

Definition

Political risk is the risk that political action will affect the position and value of a company.

When a multinational company invests in another country, eg by setting up a subsidiary, it may face a political risk of action by that country's government which restricts the multinational's freedom.

If a government tries to prevent the exploitation of its country by multinationals, it may take various measures, including the following:

Quotas	Import quotas could be used to limit the quantities of goods that a subsidiary can buy from its parent company and import for resale in its domestic markets.
Tariffs	Import tariffs could make imports (such as from parent companies) more expensive and domestically produced goods therefore more competitive.
Non-tariff barriers	Legal standards of safety or quality (non-tariff barriers) could be imposed on imported goods to prevent multinationals from selling goods through a subsidiary which have been banned as dangerous in other countries.
Restrictions	A government could restrict the ability of foreign companies to buy domestic companies, especially those that operate in politically sensitive industries such as defence contracting, communications, energy supply and so on.
Nationalisation	A government could nationalise foreign-owned companies and their assets (with or without compensation to the parent company).
Minimum shareholding	A government could insist on a minimum shareholding in companies by residents. This would force a multinational to offer some of the equity in a subsidiary to investors in the country where the subsidiary operates.

8.1.1 Assessment of political risk

There are a large number of factors that can be taken into account when assessing political risk, for example:

- Government stability
- Political and business ethics
- Economic stability/inflation
- Degree of international indebtedness
- Financial infrastructure
- Level of import restrictions
- Remittance restrictions
- Evidence of expropriation
- Existence of special taxes and regulations on overseas investors, or investment incentives

In addition micro factors, factors only affecting the company or the industry in which it invests, may be more significant than macro factors, particularly in companies such as hi-tech organisations.

8.1.2 Dealing with political risks

There are various strategies that multinational companies can adopt to limit the effects of political risk.

Negotiations with host government	The aim of these negotiations is generally to obtain a concession agreement. This would cover matters such as the transfer of capital, remittances and products, access to local finance, government intervention and taxation, and transfer pricing.
Insurance	In Bangladesh Government has introduced Export Credit Guarantee Schemes (ECGS) to deal with credit risks associated with the export trade ECGS provides protection against various threats including nationalisation, currency conversion problems, war and revolution. See Chapter 10 where overseas trade is explored.
Production strategies	It may be necessary to strike a balance between contracting out to local sources (thus losing control) and producing directly (which increases the investment and hence increases the potential loss). Alternatively it may be better to locate key parts of the production process or the distribution channels abroad. Control of patents is another possibility, since these can be enforced internationally.
Management structure	Possible methods include joint ventures or ceding control to local investors and obtaining profits by a management contract.

8.2 Cultural risk

The following areas may be particularly important depending upon the location of the overseas investment:

(a) The cultures and practices of customers and consumers in individual markets

(b) The media and distribution systems in overseas markets

(c) The different ways of doing business in overseas markets

(d) The degree to which national cultural differences matter for the product concerned (a great deal for some consumer products, eg washing machines where some countries prefer front-loading machines and others prefer top-loading machines, but less so for products such as gas turbines)

8.3 Factors influencing the choice of finance for an overseas subsidiary

In determining how an overseas investment should be financed, the following considerations need to be made:

(a) The local finance costs, and any subsidies which may be available

(b) Taxation systems of the countries in which the subsidiary is operating. Different tax rates can favour borrowing in high tax regimes, and no borrowing elsewhere. Tax-saving opportunities may be maximised by structuring the group and its subsidiaries in such a way as to take the best advantage of the different local tax systems

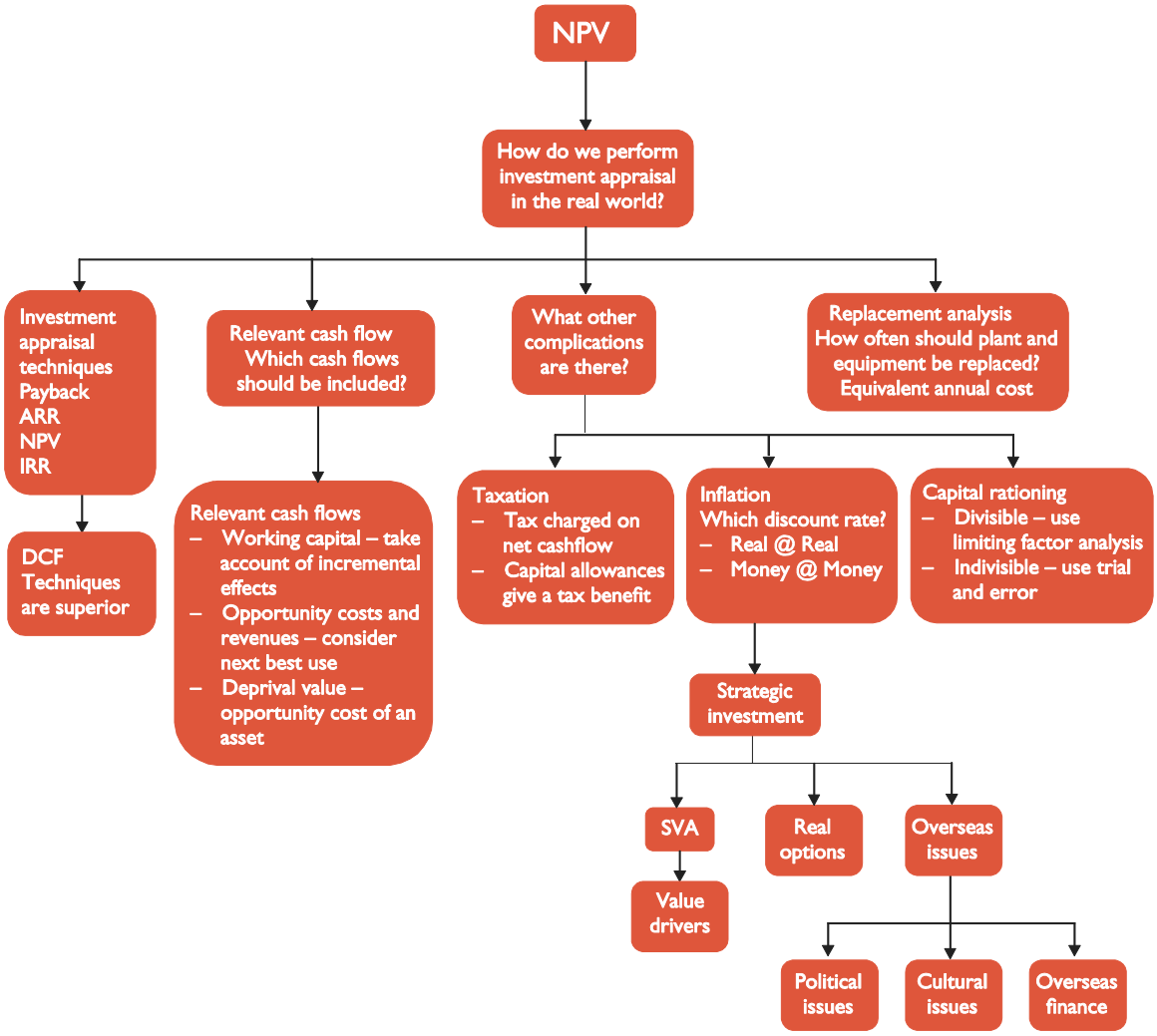
(c) Any restrictions on dividend remittances

(d) The possibility of flexibility in repayments which may arise from the parent/subsidiary relationship

(e) Access to capital. Obtaining capital from foreign markets may increase liquidity, lower costs and make it easier to maintain optimum gearing

Summary and Self-test

Summary



Self-test

Answer the following questions.

1 A company is considering investing in a two-year project. Machine set-up costs will be CU150,000 payable immediately. Working capital of CU4,000 is required at the beginning of the contract and will be released at the end.

Given a cost of capital of 10%, what is the minimum acceptable contract price to be received at the end of the contract?

2 A company is considering investing CU520,000 in machinery to manufacture a new product. The machinery has a lifetime of five years and will be depreciated on a straight-line basis to its scrap value of CU20,000. The new product will produce annual income of CU350,000, receivable annually in arrears. Variable production costs, payable annually in advance, amount to CU100,000 per annum. Fixed costs, other than depreciation, will increase by CU10,000 per annum, payable in arrears.

What (to the nearest CU1,000) is the net present value of the proposal discounting at 15%?

3 A project has a life of three years. In the first year it is expected to generate sales of CU200,000, increasing at the rate of 10% per annum over the remaining two years. At the start of each year working capital is required equal to 10% of the sales revenue for that year. All working capital will be released at the end of the project.

What is the net present value (to the nearest CU000) of the working capital cash flows of the project discounting at a rate of 20%?

4 Allen Ltd wishes to use a machine for one month on a new contract. The machine cost CU120,000 six years ago. When purchased it had an estimated life of ten years and it is being fully depreciated using the straight line method. It is currently valued at CU39,000 and its estimated value at the end of the year is CU15,000. The machine is under-used and stands idle for perhaps 30% of its time, but it must be retained for use on similar contracts.

What is the relevant cost of using the machine on the new contract?

5 A company is considering undertaking project X which will require 100 kg of a special material Q. The company has 100 kg of Q in inventory but there is no possibility of obtaining any more. If project X is not undertaken, then the company can undertake project Y which will also require 100 kg of Q. The revenues and costs associated with project Y are as follows:

Project Y revenues and costs

	CU	CU
Revenues		10,000
Less Costs		
Original purchase cost of 100 kg of Q	3,000	
Other direct costs	5,000	
		(8,000)
Profit		2,000

The 100 kg of Q can also be sold as it is for CU4,000. What is the relevant cost of using 100 kg of Q when deciding whether to accept project X?

6 Sark is tendering for contract M. The cost estimate includes CU2,750, the price paid for 100 units of part KL. These are currently held in inventory and will not be required for any other future jobs. However, if CU75 were spent on their conversion, they could be used on other work as substitutes for 100 units of part XB. These would otherwise have to be bought in at a cost of CU22 each. Alternatively, the KL parts could be sold for CU20 each.

Given that Sark's objective is to maximise its net cash inflow, what figure should be included in the cost estimate in respect of part KL?

7 Sherburn Ltd has sufficient material Y in inventory for a year's production of 'Stringfree'. Material Y cost CU8,000 but is subject to major price variations; the current market value is double the original cost. It could be sold at the market price less 15% selling expenses. An alternative is to retain it for later use by which time the market price is expected to be CU11,200.

What is the relevant cost of using material Y on the Stringfree contract?

8 A company is about to quote a price for manufacturing a special machine which will require 1,500 kg of material X and 2,000 kg of material Y. The following information is available about these resources:

Type of material	*Amount in inventory now*	*Original cost price of inventory per kg*	*Current purchase price per kg*	*Net realisable value now per kg*
	kg	CU	CU	CU
X	1,000	5	6	4
Y	2,000	8	10	7

The inventory of X cannot be used by the company for any other purpose; material Y is used frequently by the company.

What is the relevant cost of the materials for the manufacture of the special machine?

9 The following data relate to 200 kg of material ZX in inventory and needed immediately for a contract:

	CU
Standard cost	2,300
Replacement cost	2,200
Realisable value	2,000

Within the firm the 200 kg of material ZX can be converted into 200 kg of material RP at a cost of CU100. Material RP has many uses in the firm, and 200 kg cost CU2,200.

What cost should be included for material ZX when assessing the viability of the contract?

10 The following data relate to material held in inventory and needed immediately for a contract:

	CU
Replacement cost	4,000
Realisable value	3,900
Storage costs for this quantity for one month	200

There will be no alternative use for this material until one month later when the replacement cost will be CU4,300.

What cost should be included for the material when assessing the viability of the contract?

11 The following data apply to a non-current asset:

	CU
Net realisable value	5,000
Historic cost	6,000
Net present value in use	7,500
Replacement cost	10,000

What is the deprival value?

12 In the recently prepared annual accounts of Evy, closing inventory of finished goods includes CU4,800 for item X, calculated as follows:

	CU
Materials at cost	1,800
Direct labour	2,000
Production overhead	

Variable with labour cost	400
Fixed	600
Factory cost of producing item X	4,800

Soon after the year end item X was stolen and the management wishes to know its deprival value. A replacement could be made during normal working hours as Evy has spare capacity. Labour is paid on the basis of hours worked. The cost of replacement would be as in the schedule above except for materials, the replacement cost of which is now CU2,200. The item sells for CU7,000.

What is the deprival value of item X?

13 In order to manufacture a new product a firm needs two materials, S and T. There are ample quantities of both in inventory. S is commonly used within the business, whereas T is now no longer used for other products. Relevant information for the two types of material is as follows:

Material	*Quantity per unit*	*Original cost*	*Replacement cost*	*Scrap value*
	kg	CU/kg	CU/kg	CU/kg
S	2	2.40	4.20	1.80
T	3	1.00	1.40	0.40

What is the opportunity cost of materials to be used in making one unit of the new product?

14 Jason Ltd makes a product, the Elke, which sells for CU35. Its standard cost is made up as follows:

	CU
Material	11
Direct labour (2 hours)	12
Variable overhead (2 hours)	6
	29

All labour time is fully utilised. A customer approaches Jason Ltd to make a special order for which he will pay CU10,000. To carry out the order, materials will need to be purchased for CU3,000, extra fixed costs of CU500 will be incurred, and 500 hours of labour time will be required.

What is the effect of the order on profit?

15 Jones Ltd plans to spend CU90,000 on an item of capital equipment on 1 January 20X2. The expenditure is eligible for 18% writing down allowances, and Jones pays corporation tax at an effective rate of 21%. The equipment will produce savings of CU30,000 per annum for its expected useful life deemed to be receivable every 31 December. The equipment will be sold for CU25,000 on 31 December 20X5. Jones has a 31 December year end and has a 10% post-tax cost of capital.

What is the present value at 1 January 20X2 of the tax savings that result from the capital allowances?

16 A company has 31 March as its accounting year end. On 1 April 20X6 a new machine costing CU2,000,000 is purchased. The company expects to sell the machine on 31 March 20X8 for CU500,000.

The effective rate of corporation tax for the company is 21%. Writing down allowances are obtained at 18% on the reducing balance basis, and a balancing allowance is available on disposal of the asset. The company makes sufficient profits to obtain relief for capital allowances as soon as they arise.

If the company's cost of capital is 10% per annum, what is the present value at 1 April 20X6 of the effect on tax cash flows of capital allowances (to the nearest CU000)?

17 A company is considering investment in new labour-saving equipment costing CU1 million. One major saving is expected to be semi-skilled labour which in the year 20X0 is paid CU5 per hour. However, the firm expects to have to increase this labour cost at 5% per annum into the foreseeable future. If purchased, the equipment would expect to save 20,000 labour hours per year, and would be in place from the start of 20X1.

The company's money cost of capital is 15.5%.

Assuming that savings arise at the end of each year, what (to the nearest CU000) is the present value at the beginning of 20X1 of the savings over a ten year planning period?

18 A company is commencing a project with an initial outlay of CU50,000 on 1 January 20X1. It is estimated that the company will sell 1,000 items on 31 December 20X1 and at the end of each subsequent year until 31 December 20X3. The contribution per unit on 31 December 20X1 will be CU33, and is expected to rise by 10% per year over the life of the project.

At the end of the project scrap sales are expected to realise a cash amount of CU15,000. This will be received by the company on 31 December 20X3. At an inflation rate of 10% pa the real cost of capital is 10% pa.

What is the net present value of the project's cash flows at 1 January 20X1 (to the nearest CU1,000)?

19 Ackford is contemplating spending CU400,000 on new machinery. This will be used to produce a revolutionary type of lock, for which demand is expected to last three years. Equipment will be bought on 31 December 20X1 and revenue from sale of locks would be receivable on 31 December 20X2, 20X3 and 20X4. Labour and labour-related costs for the three years, payable in arrears, are estimated at CU500,000 per annum in current terms. These figures are subject to inflation at 10% per annum.

Materials required for the three years are currently in inventory. They originally cost CU300,000; they would cost CU500,000 at current prices although Ackford had planned to sell them for CU350,000. The sales revenue from locks in the first year will be CU900,000. This figure will rise at 5% per annum over the product life.

If Ackford has a money cost of capital of 15.5%, what is the net present value of the lock project at 31 December 20X1?

20 Calder Inc has been told that its 'real' cost of capital is 10%. The twin benefits from a prospective project have been estimated at CU50,000 and CU80,000 per annum. Both types of benefit are receivable in arrears and for an indefinite period; both are expressed in current terms, the former subject to 4% inflation, the latter to 8% inflation.

If the Consumer Prices Index indicates general inflation running at 7%, what is the present value of the estimated benefits?

21 Paisley Ltd plans to purchase a machine costing CU13,500. The machine will save labour costs of CU7,000 in the first year. Labour rates in the second year will increase by 10%. The estimated average annual rate of inflation is 8%, and the company's real cost of capital is estimated at 12%.

The machine has a two year life with an estimated actual salvage value of CU5,000 receivable at the end of year 2. All cash flows occur at the year end.

What is the NPV (to the nearest CU10) of the proposed investment?

22 Four projects, P, Q, R and S, are available to a company which is facing shortages of capital over the next year but expects capital to be freely available thereafter.

	Project			
	P	*Q*	*R*	*S*
	CU'000	CU'000	CU'000	CU'000
Total capital required over life of project	20	30	40	50
Capital required in next year	20	10	30	40
Net present value of project at company's cost of capital	60	40	100	80

In what sequence should the projects be selected if the company wishes to maximise net present values?

Questions 23 and 24

With reference to the following information, answer questions 23 and 24.

A company has identified a number of independent investment projects, each of which lasts two years. It is estimated that the cash flows and net present values of the projects are as follows:

	Time		*NPV*
t_0	t_1	t_2	
CU	CU	CU	CU

Project H	(500)	+250	+260	(49)
Project I	(2,000)	+1,500	+1,500	+603
Project J	+500	+650	(1,250)	+58
Project K	+350	(750)	+375	(22)
Project L	(1,000)	+600	+1,200	+537

Cash flows in t_1 and t_2 occur at the end of each year, and t_0 is the immediate inflow/outflow. Inflows from one project can be used to finance outflows for another project in the same period.

23 If the cash available for investment projects at t_0 is limited to CU2,850 and projects are *indivisible*, what is the maximum net present value that could be generated from projects?

24 If the cash available for investment projects at t_0 is limited to CU2,000 and projects are *infinitely divisible*, what will be the net present value generated from projects accepted?

25 Plum Ltd wishes to replace its existing pressing machine with a new model immediately. The new model would be replaced by the same model in perpetuity. Three new models are available as follows:

Model	*I*	*II*	*III*
Purchase price	CU50,000	CU40,000	CU70,000
Estimated life	5 years	4 years	6 years
Annual running costs			
(payable at the end of each year)	CU4,000	CU6,000	CU3,500

If model I were purchased, its life could be extended to eight years by incurring repair costs of CU30,000 after five years of use. Annual running costs of CU7,000 would be incurred at the end of each of the three years of extended life. Plum Ltd has a cost of capital of 10% per annum. Plum has the following options regarding purchasing the machine and the replacement policy.

(i) Purchase model I and replace every five years
(ii) Purchase model I and replace every eight years
(iii) Purchase model II and replace every four years
(iv) Purchase model III and replace every six years

Which new model should Plum Ltd choose, and what replacement policy should it follow if it wishes to minimise the present value of its costs?

26 A machine costing CU150,000 has a useful life of eight years, after which time its estimated resale value will be CU25,000. Annual running costs will be CU5,000 for the first three years of use and CU8,000 for each of the next five years. All running costs are payable on the last day of the year to which they relate.

Using a discount rate of 20% per annum, what would be the annual equivalent cost of using the machine if it were bought and replaced every eight years in perpetuity (to the nearest CU100)?

27 MR DIPSTICK

Mr Dipstick has been asked to quote a price for a special contract. He has already prepared his tender but has asked you to review it for him.

He has pointed out to you that he wants to quote the minimum price as he believes this will lead to more lucrative work in the future.

Mr Dipstick's tender

	CU
Material	
A, 2,000 kgs @ CU10 per kg	20,000
B, 1,000 kgs @ CU15 per kg	15,000
C, 500 kgs @ CU40 per kg	20,000
D, 50 litres @ CU12 per litre	600
Labour	
Skilled 1,000 hrs @ CU25 per hr	25,000
Semi-skilled 2,000 hrs @ CU15 per hr	30,000
Unskilled 500 hrs @ CU10 per hr	5,000
Fixed overheads 3,500 hrs @ CU12 per hr	42,000
Costs of preparing the tender	

Mr Dipstick's time	1,000
Other expenses	500
Minimum profit (5% of total costs)	7,725
Minimum tender price	166,825

Other information

Material A. 1,000 kgs of this material is in inventory at a cost of CU5 per kg. Mr Dipstick has no alternative use for this material and intends selling it for CU2 per kg. However, if he sold any he would have to pay a fixed sum of CU300 to cover delivery costs. The current purchase price is CU10 per kg.

Material B. There is plenty of this material in inventory at a cost of CU18 per kg. The current purchase price has fallen to CU15 per kg. This material is constantly used by Mr Dipstick in his business.

Material C. The total amount in inventory of 500 kgs was bought for CU10,000 some time ago for another one-off contract which never happened. Mr Dipstick is considering selling it for CU6,000 in total or using it as a substitute for another material, constantly used in normal production. If used in this latter manner it would save CU8,000 of the other material. Current purchase price is CU40 per kg.

Material D. There are 100 litres of this material in inventory. It is dangerous and if not used in this contract will have to be disposed of at a cost to Mr Dipstick of CU50 per litre. The current purchase price is CU12 per litre.

Skilled labour. Mr Dipstick only hires skilled labour when he needs it. CU25 per hour is the current hourly rate.

Semi-skilled labour. Mr Dipstick has a workforce of 50 semi-skilled labourers who are currently not fully employed. They are on annual contracts and the number of spare hours currently available for this project is 1,500. Any hours in excess of this will have to be paid for at time and a half. The normal hourly rate is CU15 per hour.

Unskilled labour. These are currently fully employed by Mr Dipstick on jobs where they produce a contribution of CU2 per unskilled labour hour. Their current rate is CU10 per hour, although extra could be hired at CU20 an hour if necessary.

Fixed overheads. This is considered by Mr Dipstick to be an accurate estimate of the hourly rate based on his existing production.

Costs of preparing the tender. Mr Dipstick has spent ten hours working on this project at CU100 per hour, which he believes is his charge-out rate. Other expenses include the cost of travel and research spent by Mr Dipstick on the project.

Profit. This is Mr Dipstick's minimum profit margin which he believes is necessary to cover 'general day to day expenses of running a business'.

Requirement

Calculate and explain for Mr Dipstick what you believe the minimum tender price should be.

(16 marks)

28 TINOCO LTD

In January 20X3 Tinoco Ltd gave the go-ahead to its research and development department to pursue work on a major new product line, code-named 'Product Z'. The cash expenditure to date on this development has totalled CU200,000, consisting of CU70,000 during 20X3 and CU130,000 during 20X4. The work is now complete, resulting in a marketable product.

In order to market this product the company will need to build and equip a new factory specifically for the purpose. A suitable site has been found which, if the company decides to go ahead with production, will be purchased on 1 January 20X5 at a cost of CU270,000. Construction of the factory will then commence immediately and take an estimated two years at a total cost of CU2.5 million. Half of this sum will be payable as a stage payment at the end of the first year of construction, the balance being payable on completion. Installation of the necessary machinery can be done during the last two months of construction and will cost a total of CU1,250,000. CU250,000 of this will be paid upon delivery and the balance in two equal annual instalments on the anniversary of delivery.

The company intends to undertake a significant advertising campaign for this new product, which will commence twelve months before completion of the factory. During its first year this campaign will cost CU150,000 and will then continue for the next two years at a cost of CU250,000 and CU100,000 respectively in each of those years. Payment will be made at the end of each of the three years. As a consequence of this campaign the company is forecasting an annual demand for Product Z of 400,000 units and expects this demand level to continue for ten years after production commences. Initial production will commence immediately upon completion of the factory at an annual rate to match demand.

Production costs will consist of CU4 per unit of variable costs and annual fixed costs of CU300,000. After five years of production the equipment within the factory will need replacement. The old machinery will be sold for CU250,000 and new equipment acquired at the same cost and on the same terms as the original equipment. This replacement can be achieved without disruption to production.

At the end of the ten-year production period the product will be abruptly discontinued, and the production facility will then be surplus to the company's requirements. It is expected that the machinery can be sold at that time for CU250,000 and that the factory and site will command a price of CU3 million.

Despite extensive market research during the last six months at a cost of CU50,000 the company remains uncertain as to the price it will be able to charge for this new product. However, the sales director is currently suggesting a selling price of CU7.50 per unit.

The company's discount rate is 15% per annum.

Requirements

(a) Calculate the net present value of the proposed new production, assuming the sales director's forecast selling price is correct. **(12 marks)**

(b) Calculate the minimum selling price that must be set in order to make Product Z a viable proposition. **(3 marks)**

(15 marks)

29 SHAW SECURITY SYSTEMS LTD

Shaw Security Systems Ltd, a company financed by a mixture of equity and debt capital, manufactures devices which seek to deter the theft of motor vehicles. The company's development department has recently produced a new type of anti-theft device. This device, which will be known as an Apollo, will be fitted to private motor vehicles. The Apollo emits an electronic signal which can be picked up by an electronic sensor fitted to police cars, enabling the police to locate stolen cars and, possibly, apprehend the thief. Development costs totalled CU500,000. These were all incurred in 20X5.

A decision now needs to be taken as to whether to go ahead with producing and marketing Apollos. This is to be based on the expected net present value of the relevant cash flows, discounted at the company's estimate of the 20X5 weighted average cost of capital of 8% (after tax). The company's management believes that a three year planning horizon is appropriate for this decision, so it will be assumed that sales will not continue beyond 20X8.

Following discussions with a number of police forces, the company has reached agreement that, if it decides to go ahead with the project, one of the Midland forces will trial the Apollo system, and the sensors will be fitted to its police cars.

The cost of providing and fitting the sensors to the police cars would be borne by the company, which would retain ownership. The police force would bear the cost of maintenance. The sensors would be manufactured and fitted by a sub-contractor, who has offered to do this work by the end of 20X5 for a total cost of CU1 million, payable immediately on completion of the work. This cost would attract the normal capital allowances for plant and equipment at 18% reducing balance. If the company were to make the investment, it would elect for the sensors to be treated as a short-life asset. At the end of three years the sensors would be scrapped.

The first sales of Apollos would be expected to be made during the year ending 31 December 20X6. There is uncertainty as to the level of sales which could be expected, so a market survey has been undertaken at a cost of CU100,000.

The survey suggests that, at the company's target ex-works price of CU200 per Apollo, there would be a 60% chance of selling 10,000 Apollos and a 40% chance of selling 12,000 during 20X6.

If the 20X6 sales were to be at the lower level, 20X7 sales would be either 8,000 Apollos (30% chance) or 10,000 (70% chance). If 20X6 sales were to be at the higher level, 20X7 sales would be estimated at 12,000 Apollos (50% chance) or 15,000 (50% chance).

20X8 sales would be expected to be 50% of whatever level of sales were to occur in 20X7.

Sales of Apollos would be expected to have an adverse effect on sales of the Mercury, a less sophisticated device produced by the company, to the extent that for every two Apollos sold one less Mercury would be sold. This effect would be expected to continue throughout the three years.

Materials and components would be bought in at a cost of CU70 per Apollo. Manufacture of each Apollo would require three hours of labour. This labour would come from staff released by the lost Mercury production. To the extent that this would provide insufficient hours, staff would work overtime, paid at a premium of 50% over the basic pay of CU6 an hour.

The Mercury has the following cost structure.

	CU per unit
Selling price (ex-works)	100
Materials	20
Labour (4 hours)	24
Fixed overheads (on a labour hour basis)	33

The management team currently employed by the company would be able to manage the Apollo project except that, should the project go ahead, four managers, who had accepted voluntary redundancy from the company, would be asked to stay until the end of 20X8. These managers were due to leave the company on 31 December 20X5 and to receive lump sums of CU30,000 each at that time. They were also due to receive an annual fee of CU8,000 each for consultancy work, which the company would require of them from time to time. If they were to agree to stay on, they would receive an annual salary of CU20,000 each, to include the consultancy fee. They would also receive lump sums of CU35,000 each on 31 December 20X8. It is envisaged that the managers would be able to fit any consultancy requirements round their work managing the Apollo project. These payments would all be borne by the company and would qualify for full tax relief.

Apollo production and sales would not be expected to give rise to any additional operating costs beyond those mentioned above.

Working capital to support both Apollo and Mercury production and sales would be expected to run at a rate of 15% of the ex-works sales value. The working capital would need to be in place by the beginning of each year concerned. There would be no tax effects from changes in the level of working capital.

The company's accounting year end is 31 December. Sales should be assumed to occur on the last day of the relevant year. The company's corporation tax rate is expected to be 21% throughout the planning period. Tax cash flows occur at the end of the accounting period to which they relate.

Requirements

(a) Prepare a schedule which derives the annual expected net cash flows from the Apollo project, and use it to assess the project on the basis of its expected net present value. **(18 marks)**

(b) Comment on the assessment of the project made in requirement (a) and any reservations you have about using it as the basis for making a decision as to whether to proceed with the project. **(4 marks)**

Ignore inflation.

Work to the nearest CU1,000. **(22 marks)**

30 FIORDILIGI LTD

Fiordiligi Ltd is evaluating a potential new product, the ottavio, in which the following costs are involved.

(a) **Labour**

Each ottavio requires 1/2 hour of skilled labour and 2 hours of unskilled labour. During the next year Fiordiligi expects to have a surplus of skilled labour, retained on contracts under which the minimum wage is guaranteed. This surplus is sufficient to complete the budgeted quantity of ottavios in the first year, but there will be no surplus thereafter. All unskilled labour will be taken on as required.

The wage rates are CU4.00 per hour for skilled labour and CU2.50 per hour for unskilled.

(b) **Materials**

(i) Material 'Ping' is used in the ottavios, 2 kgs per unit. No inventories of Ping are held by the company.

(ii) Material 'Pang' is used at the rate of 0.5 kg per unit of ottavio. Sufficient of this material to meet the entire budgeted production is already in inventory; it has no other use.

(iii) Material 'Pong' is also used; 1.5 kgs are required per unit. Some inventories are already held; further supplies may readily be purchased. Pong is used in the manufacture of another product, the masetto, which earns a contribution of CU0.85 per kg of Pong, net of the cost of Pong, and depreciation at an estimated CU0.06 per kg.

The value of the various materials may be summarised as follows.

	Ping	*Pang*	*Pong*
	CU	CU	CU
Cost of material in inventory (per kg)	–	CU2.00	CU0.70
Current replacement cost (per kg)	CU1.40	CU2.20	CU0.80
Current realisable value (per kg)	CU1.10	CU1.80	CU0.65

Any materials requiring purchase will be bought in advance of the year for which they are needed.

(c) **Overheads**

(i) Variable overheads are expected to be incurred at the rate of CU1.40 per skilled labour hour. This represents the extra cash cost expended.

(ii) Fixed overheads will be affected by the project as follows.

(1) A new factory will be leased at an annual rental of CU2,000 in advance for the life of the project.

(2) Rates on the factory (payable in arrears) will be CU1,000 per annum.

(3) The equipment (see below) will be written down to its realisable value over the life of the project.

(4) The central management accounting department will absorb administration costs into production on the basis of CU0.50 per *unskilled* labour hour. Direct administration of the project will be carried out by management without any increase in overtime or staffing levels.

It is expected that ottavios will be produced for three years at the rate of 10,000 units per annum, and then for a further two years at the rate of 8,000 units per annum. The selling price will be CU18 per unit in the first three years and CU14 thereafter.

Special machinery will be purchased at the start of the project for CU60,000. It will be sold at the end of the fifth year for CU6,000.

Requirement

Calculate the net present value of the projected production of ottavios, and hence advise the directors whether or not to proceed. The company's cost of capital for investments of this nature is 15%. **(15 marks)**

Note: Ignore taxation.

31 GIOVANNI LTD

Giovanni Ltd is considering investing in an ice cream plant to operate for the next four years. After that time the plant will be worn out, and Giovanni, the owner of the company, wishes to retire in any case. The plant will cost CU5,000 and is expected to have no realisable value after four years. If worthwhile the plant will be purchased at the end of an accounting period. Capital allowances at the rate of 18% per annum (reducing balance) will be available in respect of the expenditure.

Revenue from the plant will be CU7,000 per annum for the first two years and CU5,000 per annum thereafter. Incremental costs will be CU4,000 per annum throughout.

You may assume that all cash flows occur at the end of the financial year to which they relate. Assume Giovanni Ltd pays corporation tax at 21% and has a cost of capital of 10%.

Requirements

(a) Calculate the tax saved through capital allowances and show when the savings arise. **(3 marks)**

(b) Advise Giovanni Ltd on whether or not to proceed with investment in the ice cream plant. **(4 marks)**

(c) Show what difference it would make if the plant were to be purchased and sold at the beginning of the accounting period. Comment on the wisdom of disposing of an asset on the first day of an accounting period. **(3 marks)**

(10 marks)

32 SHAREHOLDER VALUE

(a) The following statements appear in the objectives of two well-known public limited companies.

'We never confuse why we exist – to create the maximum possible returns to our shareholders.'

'In everything the company does, it is committed to creating wealth, always with integrity, for our employees, customers, suppliers and the community in which we operate.'

Requirement

Discuss these two different perspectives of the operation of a firm, and explain why they are not necessarily contradictory. **(5 marks)**

(b) The managing director of the first company believes that the best external measure of shareholder wealth maximisation is growth in earnings per share (EPS).

Requirement

Critically evaluate this belief. Suggest three value drivers on which a business can focus, and why their management will increase shareholder wealth. **(6 marks)**

(11 marks)

33 PACKERS LTD

Packers Ltd has been offered a contract to manufacture a batch of chemicals. The company's managers estimate that it will take two years to produce the chemicals. The price offered is CU235,000 expressed in current pounds sterling. This price will be increased in line with increases in the Consumer Price Index during the contract period, and the adjusted amount will be paid in full when the chemicals are delivered at the end of two years.

Production of the chemicals will require the following resources.

(1) A machine will be purchased immediately for CU75,000 for exclusive use on this contract. The machine will have a two-year life and no scrap or resale value.

(2) Ten workers who are currently employed by the company will each work for two years on production of the chemicals. The total cost of employing one worker is currently CU6,000 per annum, based on wage rates which have recently been agreed for the coming year. The managers expect to negotiate wage rates at the end of one year; as a result they expect that total employment costs for the second year of the contract will rise by 12.5%. You may assume that all employment costs are payable on the last day of the year to which they relate.

If the chemicals contract is not accepted, there will be no work within the company for the ten workers during the coming two years and they will be made redundant. The company will incur a net redundancy cost of CU200 for each worker payable immediately. The managers expect new orders after two years and the company will re-employ the ten workers at the end of the second year. Administrative and advertising costs associated with the re-employment are expected to be CU500 per person. This amount will not be affected by inflation during the next two years.

(3) 2,000 units of raw material D will be needed immediately and 2,000 units will be needed at the end of one year. Packers Ltd has 2,000 units of D in inventory. These units originally cost CU18 per unit and have a current replacement cost of CU20 per unit. The company has no use for material D other than on the contract offered and, if the contract is rejected, the units in inventory will be disposed of at an

immediate cost of CU1.50 per unit. (The material is highly specialised and cannot be re-sold.) The cost of buying material D is expected to rise by 15% during the coming year.

Packers Ltd has a discount rate of 15% per annum, which reflects the inflation expected over the life of the contract, and the Consumer Price Index rise is 10% per annum.

Requirement

Calculate the net present value of the contract which has been offered to Packers Ltd. **(10 marks)**

34 AINSDALE LTD

Ainsdale Ltd, an all equity company, manufactures a single product, an item of exercise equipment for use in the home. The company is considering moving one of its factories to a new site.

Moving to new premises would take place on 1 January 20X1. It would cause significant disruption to existing sales and production, and incur substantial initial costs. The new site would mean, however that output would no longer be constrained by the size of the factory and hence, when there is sufficient demand, higher output and sales can be achieved.

If the move takes place the existing premises would be leased out indefinitely for an annual rental of CU450,000 payable in advance commencing 1 January 20X1. Lease rentals would be subject to corporation tax.

The cost of new premises would be CU10 million payable on 1 January 20X1. Assume that the premises would not qualify for industrial buildings allowances.

Improved machinery for the new factory would be purchased at 31 December 20X0 at a cost of CU1 million. This machinery would be expected to be sold on 31 December 20X4 for CU300,000. The old machinery, which has a zero written down value, would need to be scrapped at 31 December 20X0 if the new factory is purchased but, due to its specialist nature, would not generate any proceeds. It would, however, continue to be used if the company were not to move to the new factory.

Machinery is subject to a 'short-life' asset election and excluded from the general pool (ignore re-pooling). This means that it attracts 18% (reducing balance) tax allowances in the year of its acquisition and in every subsequent year of its being owned by the company, except the last year. In the last year the difference between the machinery's written down value for tax purposes and its disposal proceeds will either be allowed to the company as an additional tax relief, if the disposal proceeds are less than the written down value, or be charged to the company if the disposal proceeds are more than the tax written down value.

The maximum production capacity of the new factory would normally be 10 million units per year and that of the existing factory is 6 million units per year. Due to setting-up time and disruption from moving, however, the capacity of the new factory in 20X1 would be only 5 million units. Potential demand for the company's output in the years ending 31 December is estimated as follows.

	Units (millions)
20X1	8
20X2	9
20X3	10
20X4	9
20X5 and thereafter	6

Given that projected sales and output are equal for both factories in the year 20X5 and thereafter, no incremental manufacturing costs or revenues will arise from the move after 20X4.

Labour is employed under flexible contracts. It is thus estimated that labour costs will vary directly with output, being CU1 per unit of output. This is the case at both the existing and the new factory.

Material quantities per unit of output and costs per kg are as follows.

	Quantity kgs	*Cost per kg* CU
Material XM2	2	1.50
Material TS4	1	1.25

Material XM2 would only be available from an overseas supplier during 20X1 and 20X2, and this would lead to a transport cost on material purchases of CU1.75 per kg in addition to the basic CU1.50 per kg during those two years. From 20X3, however, it is expected that a UK supplier will be able to provide the material for CU1.50 per kg.

The selling price per unit is set to achieve a contribution of 40% of selling price. For this purpose contribution is defined as selling price less labour and material costs. It excludes transport costs, training and redundancy costs.

If the company decides to move site, some employees are expected to refuse to move. This is expected to lead to redundancy payments of CU200,000 which will be made on 1 January 20X1. Retraining costs of CU100,000 will be incurred on 31 December 20X0 in respect of the replacement employees.

The corporation tax rate can be assumed to be 21%. Assume that tax is paid at the end of the accounting year in which the transaction occurs. There are expected to be sufficient taxable profits available to set off all allowances.

The annual after-tax cost of capital is 10%. The company prepares its accounts to 31 December each year. All cash flows can be assumed to arise at year ends unless otherwise specified.

Requirements

(a) Identify the annual net incremental cash flows that would arise from Ainsdale Ltd's decision to move the location of its factory, and use them to calculate the net present value at 1 January 20X1. **(18 marks)**

(b) Calculate the payback period in respect of the incremental cash flows which would arise from Ainsdale Ltd's decision to move the location of its factory. **(3 marks)**

Ignore inflation. **(21 marks)**

35 ARCADIAN PRODUCTS LTD

The management of Arcadian Products Ltd is considering the introduction of a new product, code named NP14. The company's finance department has undertaken some investigations and has assembled the following information relating to NP14 production.

(1) Annual contributions from NP14s are expected to be as follows.

Year	CUm
20X1	2.5
20X2	3.5
20X3	3.5
20X4	2.5

Production and sales would be expected to cease at the end of 20X4. Sales and operating expenses are assumed to occur on the last day of the relevant year. The company's accounting year is to 31 December.

(2) Production of NP14s would require the use of some new equipment.

This equipment could be bought and paid for at the end of 20X0 at a cost of CU12 million. It would be scrapped at the end of 20X4 for an estimated CU2 million. Under the contract to buy this equipment there would be an obligation for the supplier to maintain the equipment throughout its four-year life at no cost to the company.

Alternatively, production could use existing equipment already owned by the company. This equipment is currently not in use and would be sold on 31 December 20X0 for an estimated CU3 million, were it not to be used in NP14 production. It was bought for CU10 million and first used during 20W8. It would be expected to continue to operate effectively in the production of NP14s until the end of 20X4, when it would be expected to be scrapped (zero sales proceeds).

You should assume that all items of equipment are treated as 'short-life' assets and excluded from the 'pool'. This means that the equipment attracts a 18% (reducing balance) tax allowance in the year of acquisition and in every subsequent year of ownership by the company, except the last year. In the last year the difference between the equipment's written-down value for tax purposes and its disposal proceeds is expected to be treated as an additional relief, if the disposal proceeds are less than the written-down value; or be charged to the company, if the disposal proceeds are more than the tax written-down value.

A problem with using the existing equipment is that it would require a relatively high level of maintenance to enable it to operate as effectively as the new equipment. The annual maintenance costs of the old equipment are estimated to be as follows.

Year	CUm
20X1	0.5
20X2	1.5
20X3	2.0
20X4	2.5

(3) Labour for NP14 production, included in calculation of the contributions, would be hired for the duration of the production period.

(4) NP14 production would require the support of working capital equal to 10% of the contributions. This would need to be in place by the start of each year. It has no tax implications. The maintenance costs, were the existing plant to be used, would not give rise to any working capital requirement.

(5) The corporation tax rate is expected to be 21% for the foreseeable future. Assume that tax will be paid at the end of the year in which the event giving rise to it occurs.

(6) All operating cash flows are expected to increase by an annual factor of 3%, due to general inflation. Except for the expected disposal proceeds of the equipment, all of the financial information given above is expressed in terms of 1 January 20X1 prices.

The company's real cost of capital, on all of its activities, is estimated at 10% per annum.

(7) There are no incremental costs or benefits other than those to which reference is made above.

Requirements

(a) Assuming that NP14 production and sales would be economically viable, produce a schedule of annual cash flows and use it to indicate whether the company should use the existing equipment or acquire new equipment. **(13 marks)**

(b) Taking account of the decision reached in (a), produce a schedule of annual cash flows and use it to indicate whether NP14 production would be economically viable. **(8 marks)**

Work to the nearest CU000. **(21 marks)**

36 JUNO PRODUCTS LTD

Juno Products Ltd leases a factory in North Wales where, among other products, it makes a component, known as the MC15, which is used in the manufacture of civil airliners and sold to aircraft manufacturers worldwide. The factory's lease expires on 31 December 20Y2, so the company intends to review the future of all of its production there in anticipation of that event. Meanwhile the immediate future of MC15 production is in doubt. Some members of the company's management team believe that recent developments in aircraft design have rendered the MC15 an uneconomic prospect for the company during the four years 1 January 20X9 to 31 December 20Y2. As a member of the company's finance staff you have been asked to make an assessment of the economic viability of the MC15 over the next four years on the basis of net present value. It seems fairly certain that, irrespective of the short-term future of the MC15, its manufacture will not be continued beyond 20Y2.

Estimated sales demand for the MC15 over the next four years ending 31 December at a unit selling price of CU35,000 is as follows.

Year	*Units*
20X9	500
20Y0	500
20Y1	400
20Y2	300

It is believed, however, that were a modification to be made to the design of the MC15, demand could be raised to 700 units in each of the first two years, but this modification would have no effect on demand for 20Y1 and 20Y2. The modification could be effected by 31 December 20X8.

It would cost CU8 million, payable on 31 December 20X8, and this amount would be fully allowable for corporation tax for the year in which this expenditure would be incurred.

The factory is leased for a fixed CU6 million per annum payable annually in advance.

The direct, variable manufacturing costs of each MC15 are as follows.

	CU
Direct labour	4,000
Raw material and bought-in parts	7,000

The company generally operates a 'just-in-time' inventory holding policy, which means that the inventories of nearly all of the materials and parts are negligible. In the case of one bought-in part, however, there will be an inventory of 1,000 units at 1 January 20X9. This arose because, early in 20X8, the company was offered a special deal on this item provided that it was prepared to make a bulk purchase. This bought-in part is included in the raw material and bought-in parts total above at its normal price of CU1,000 per unit. Each MC15 requires the use of one of these parts and this part can be used only in the manufacture of MC15s. The bulk purchase was made at a price of CU800 per unit. If MC15 production were not to continue, the inventory could be sold for CU600 per unit on 31 December 20X8 for immediate cash settlement. Any necessary tax adjustments resulting from this inventory can be ignored.

Ceasing MC15 production would release 25% of the factory space, but this could not be used for any other activity. The labour released could, however, be transferred to another department of the factory for work on another of the company's products. Demand for that product exceeds the ability of the company to meet it due to a shortage of labour, a shortage which would otherwise persist throughout the four years. For every CU1's worth of labour transferred, it is estimated that a contribution (sales revenue less direct labour and materials) of CU3 could be generated. The possible additional sales of MC15s during 20X9 and 20Y0, should the modification be undertaken, would not affect the output of the other product.

Plant, bought for CU10 million on 1 January 20X7, is used in the manufacture of MC15s. It could be disposed of on 31 December 20X8 for an estimated CU6 million. By 31 December 20Y2 it would be expected to have no market value. This plant was the subject of an election to be treated as a 'short-life asset' and excluded from the 'pool'. This means that it attracted 18% (reducing balance) tax allowances in the year of its acquisition and in every subsequent year of its being owned by the company, except the last year. In the last year the difference between the plant's written down value for tax purposes and its disposal proceeds will either be allowed to the company as an additional tax relief, if the disposal proceeds are less than the tax written down value, or be charged to the company if the disposal proceeds are more than the tax written down value.

It is estimated that overheads (excluding lease payments) apportioned to MC15 total CU5 million per annum. Of this amount CU2 million can be avoided by ceasing MC15 production.

The company's accounting year end is 31 December. The corporation tax rate is expected to be 21% throughout the period concerned. Tax can be assumed to be payable at the end of the year in which the event giving rise to it occurs.

There are no other incremental cash flows associated with MC15 production and sales.

All cash flows can be treated as occurring on the last day of the year to which they relate, unless specified otherwise.

The company uses its after-tax long-term borrowing rate of 5% per annum to assess projects, and you are expected to follow this approach.

Requirements

(a) Assuming that MC15 production and sales continue until 20Y2, assess whether it would be economically viable to pay for the modification to the design of the product. **(4 marks)**

(b) Using the results from (a), prepare a statement which shows the annual relevant cash flows associated with a decision on whether on the basis of net present value to cease production of MC15s at 31 December 20X8 or to continue production until 31 December 20Y2. **(11 marks)**

(c) Discuss the suitability of using the long-term borrowing rate as the discount rate for project evaluation. **(3 marks)**

Ignore inflation. **(18 marks)**

37 REXAL LTD

Rexal Ltd is a small company that specialises in the manufacture of pit-props and supports.

Management see the maximisation of shareholders' wealth as the primary business objective. The company is profitable and is able to utilise capital allowances obtained on new capital investment at the earliest opportunity. The directors have never felt comfortable with debt finance and as a consequence there is negligible long-term debt in the company's capital structure.

A local coal field has approached Rexal Ltd recently requesting the production of some special pit-props. After researching the contract it emerged that there were two options available to the company.

These are outlined below.

Option 1

A new machine will be purchased for CU80,000, payable on 1 January 20X1. The machinery will be sold for CU8,000 on 31 December 20X3.

Any labour required under this option will have to be recruited.

The net year-end operating cash inflows are budgeted as follows.

	CU
20X1	60,000
20X2	74,000
20X3	88,000

These figures are stated in money terms and are before corporation tax.

Option 2

As an alternative to acquiring new equipment and extra labour, use could be made of existing resources.

A machine acquired many years ago for CU120,000 could be used on this project. It was to be sold on 1 January 20X1 for CU30,000. If used it is felt that its realisable value would be zero due to the three extra years of use. The current tax written down value of this asset is nil; all available capital allowances on this asset were taken as 100% first year allowances in its first year of use.

The net year-end operating cash inflows under option 2 are the same as for option 1, except for the following two factors.

(a) Extra running costs of CU5,000 in 20X1, which will rise in line with inflation thereafter, will be incurred due to using the old machinery.

(b) The labour used for option 2 will be moved from existing company operations. This will lead to a loss of contribution on such operations of CU20,000, CU22,000 and CU23,500 in the three years respectively.

Working capital equal to 10% of that year's net cash inflows, excluding tax flows, will be required at the beginning of each year for both options. This will be released at the end of the project. There are no tax effects associated with movements in working capital. (In the case of option 2, net cash inflows should be taken as the values after adjustment for the machine and labour costs.)

The company's real cost of capital is estimated at 15% per annum and is expected to remain at that rate for the foreseeable future.

Inflation rates have been estimated for the next four years as follows.

20X1	10%
20X2	8%
20X3	6%
20X4	4%

The company's financial year runs to 31 December. Corporation tax is payable at 21%.

Requirements

(a) Calculate the net present values at 31 December 20X0 of each of the two options. **(15 marks)**

(b) Indicate any reservations you might have in basing an investment decision on these figures. **(3 marks)**

(18 marks)

38 SOUTHSEA LTD

Southsea Ltd (Southsea) manufactures high specification stretchers for its sole customer, HealthTrans Ltd (HealthTrans), which supplies ambulances and ancillary products to the UK National Health Service and a range of private hospitals and firms.

HealthTrans is currently experiencing rapid growth in business levels. As a result, Southsea has recently been offered a new five-year contract with HealthTrans which will start on 1 January 20X2. Under this contract HealthTrans would guarantee to buy its entire stretcher requirements from Southsea, assuming that Southsea were able to supply all of its needs.

Demand from HealthTrans under the existing contract in the year ending 31 December 20X1 is expected to be 1,000 stretchers. However, HealthTrans forecasts that this demand will rise at a compound rate of 10% pa over the five years of the new contract.

At the present time Southsea has a production capacity of 1,050 stretchers pa, but the company is considering making an investment in production facilities that would see its annual capacity rise to 1,500 stretchers pa. However, the new contract with HealthTrans will go ahead, using existing production facilities, whether or not Southsea decides to increase its production capacity. In any one year, Southsea will only ever produce sufficient stretchers to meet that year's annual demand ie, it will not hold inventory.

In the year ending 31 December 20X1, the price per stretcher is CU2,500, but the contract on offer contains a commitment from HealthTrans to accept an increase in this price over the period of the contract at the UK rate of inflation, which is expected to be 2% pa up to 31 December 20X4 and 3% pa thereafter.

The total cost of the component parts of each stretcher during the year ending 31 December 20X1 is CU1,200. Due to the highly competitive nature of the market for these component parts, this cost will not be subject to annual inflation, but rather is expected to fall at a compound rate of 1% pa over the life of the contract due to the economies of scale that would arise from the increased levels of production.

Labour costs are also expected to be subject to efficiency gains which will be sufficient to cancel out the effect of any wage inflation. The cost of labour is therefore expected to remain constant over the life of the contract at CU300 per stretcher.

Anticipated efficiency gains associated with the increased production levels also mean that the impact on working capital requirements and fixed costs will be negligible and can be ignored.

In order to achieve the proposed increase in production capacity, investment in production facilities of CU2 million would be required and this would take place on 31 December 20X1. The new facilities would have an estimated useful life of five years at the end of which they are estimated to have no residual value.

The company's corporation tax rate is expected to be 21% for the foreseeable future, and it can be assumed that tax payments occur at the end of the accounting year to which they relate. The directors are also assuming that the new facilities will attract full capital allowances at 18% pa on a reducing balance basis commencing in the year of purchase and continuing throughout the company's ownership of the new facilities. A balancing charge or allowance will arise on disposal of the new facilities which can be assumed to be on 31 December 20X6. Sufficient profits are available for the firm to claim all such tax allowances in the year they arise.

The company's real after-tax cost of capital is 7% pa, and its accounting year end is 31 December. Assume that all annual operating cash flows arise at the year end.

As the relationship between Southsea and HealthTrans has developed, directors of both companies have increasingly considered the possibility of a merger between the two companies.

Requirements

(a) Calculate the net present value at 31 December 20X1 of the proposed investment in increased production facilities and, on the basis of your calculation, state whether or not Southsea should proceed. **(16 marks)**

(b) Identify and explain the type of real option that might be most relevant to Southsea's consideration of its investment decision. **(3 marks)**

(c) Outline in general terms the potential advantages of a merger between Southsea and HealthTrans. **(3 marks)**

(22 marks)

39 RFA LTD

RFA Ltd (RFA), an all equity financed company, manufactures a limited range of sports equipment. Its financial year end is 31 March. RFA's board is considering replacing one of its machines (the RF13) which is employed in the manufacture of golf balls. It is estimated that the RF13 has two more years of production left, but the new machine (which, if purchased, would be known as the RF17) has an improved technical specification and could produce a higher quality ball which, it is felt, would generate an increase in sales. The new machine would be bought at the end of the current financial year, i.e. 31 March 20X9 and would cost CU1.7 million. Technological advancement in RFA's market is rapid and its board therefore has plans to use the new machine for a maximum of three years to 31 March 20Y2. The estimated sales figures (expressed in March 20X9 prices) from using the two machines are:

		Existing machine (RF13)	*New machine (RF17)*
		CU'000	CU'000
Year ended 31 March	20Y0	620	1,150
	20Y1	600	1,450
	20Y2	0	1,320

Variable costs

The average variable costs of the two machines (as a percentage of sales revenue in 20X9 prices) are as follows:

	RF13	*RF17*
	%	%
Raw materials	10	12
Other variable costs	25	18

Labour costs

RFA uses contractors to operate its machines. The cost is CU150,000 per annum. If the RF17 is purchased annual savings of 12% will be made on these contracted labour costs. All of these costs are expressed in March 20X9 prices.

Estimated annual inflation rates (April 20X9 to March 20Y2)

	%
General (applies to RFA's sales and other variable costs above)	3
Raw materials	5
Contracted labour	2

Working capital

RFA's policy is that, at the start of each financial year, it has working capital in place that is equivalent to 10% (in money terms) of the estimated sales for that year. RFA assumes that all working capital is recoverable once the equipment is sold.

Capital allowances

RFA's machinery attracts capital allowances, but is/will be excluded from the general pool. The RF13 has a negligible tax written down value and it has a current resale value of CU100,000. Its use would be discontinued as soon as the RF17 was purchased. RFA's board believes that the RF13 would have a resale value of CU80,000 (in money terms) at 31 March 20Y1 and that the RF17 would have a resale value of CU200,000 (in money terms) at 31 March 20Y2.

Assume that this means that the RF17 will attract 18% (reducing balance) tax allowances in the year of expenditure and in every subsequent year of ownership by the company, except the final year. In the final year, the difference between the machinery's written down value for tax purposes and its disposal proceeds will be either (i) treated by the company as an additional tax relief, if the disposal proceeds are less than the tax written down value, or (ii) be treated as a balancing charge to the company, if the disposal proceeds are more than the tax written down value.

Corporation tax

RFA assumes that the tax rate will remain at 21% per annum and is payable in the same year as the cash flows to which it relates.

Cost of capital

RFA uses a money cost of capital of 11% per annum for appraising its investments.

Requirements

(a) Advise RFA's management whether it is beneficial, in net present value terms, to acquire the RF17 and dispose of the RF13. **(20 marks)**

(b) Compare sensitivity analysis and expected values as methods of dealing with uncertainty. **(4 marks)**

(24 marks)

40 STICKY FINGERS LTD

After paying CU15,000 for a preliminary investigation, the costing department of Sticky Fingers Ltd was able to calculate the cash flows for the following investment projects.

Net cash flows	t_0 *Immediate outlay*	t_1	t_2	t_3	t_4
	CU'000	CU'000	CU'000	CU'000	CU'000
Project A	(1,500)	(500)	1,200	600	300
Project B	(2,000)	(1,000)	2,500	2,500	2,500
Project C	(1,750)	500	1,100	1,400	1,000
Project D	(2,500)	700	900	1,300	300
Project E	(1,600)	(500)	200	2,800	2,300

Note. All cash flows take place at the end of the year.

You have only just taken up the appointment of financial analyst. The cash flows from the various projects, as shown above, have been given to you with a memorandum from the managing director outlining your first task.

Requirements

Advise the company in the following circumstances.

(a) The company's cost of capital has been calculated as 15%. Cash is freely available and all projects are independent and divisible. Prepare calculations showing which projects should be accepted. **(3 marks)**

(b) The amount of cash available for investment at time 0 has been limited to CU3 million. None of the projects can be delayed.

Which projects should be accepted? **(3 marks)**

(c) The amount of cash available for investment at time 1 has been limited to CU200,000. None of the projects can be delayed. There is now no rationing at time 0.

Which projects should be accepted? **(5 marks)**

(d) The situation is as in part (b) except that now all projects are independent but indivisible, and CU3.5 million is available.

Which projects should now be accepted? **(2 marks)**

(13 marks)

41 IGLOO LTD

Igloo Ltd has identified the following investment projects.

	t_0 *Immediate outlay*	t_1 *Time 1*	t_2 *Time 2*
	CU'000	CU'000	CU'000
Project A	(100)	(100)	303.6
Project B	(50)	(100)	218.9
Project C	(200)	100	107.8
Project D	(100)	(50)	309.1
Project E	(200)	(50)	345.4

Requirements

Advise in the following circumstances.

(a) The company faces a perfect capital market, where the appropriate discount rate is 10%. All projects are independent and divisible.

Which projects should the firm accept? **(2 marks)**

(b) The company faces capital rationing at t_0. There is only CU225,000 of finance available. None of the projects can be delayed.

Which projects should the firm accept? **(2 marks)**

(c) The situation is as in part (b) above, except that you are now informed that projects A and B are mutually-exclusive.

Which projects should now be accepted? **(2 marks)**

(d) The solution is as in part (b) above, except that you are now told that all projects are independent but indivisible.

Which projects should be accepted? What will be the maximum NPV available to the company? **(2 marks)**

(e) All projects are independent and divisible. There is capital rationing at t_1 only. No project can be delayed or brought forward. There is only CU150,000 of external finance available at t_1.

Which projects should be accepted? **(3 marks)**

(11 marks)

42 STAN BELDARK

Stan Beldark is a wholesaler of lightweight travelling aids. His company employs a large number of sales representatives, each of whom is supplied with a company car. Each sales representative travels approximately 40,000 miles per annum visiting customers. Stan wishes to continue his present policy of always buying new cars for the sales representatives but wonders whether the present policy of replacing the cars every three years is optimal. He believes that keeping the cars longer than three years would result in unacceptable unreliability and wishes to consider whether a replacement period of either one year or two years would be better than the present three year period. The company's fleet of cars is due for replacement in the near future.

The cost of a new car, at current prices, is CU5,500. Resale values of used cars, which have travelled similar mileages to those of Stan's firm, are CU3,500 for a one-year-old car, CU2,100 for a two-year-old car and CU900 for a three-year-old car, all at current prices. Running costs at current prices, excluding depreciation, are as follows.

	Road fund licence and insurance	*Fuel, maintenance repairs, etc*
	CU	CU
During first year of car's life	300	3,000
During second year of car's life	300	3,500
During third year of car's life	300	4,300

Stan uses a discount rate of 10% when making such decisions.

Running costs and resale proceeds are paid or received on the last day of the year to which they relate. New cars acquired for use from the start of year 1 are purchased on the last day of the previous year.

Requirement

Prepare calculations for Stan Beldark showing whether he should replace the cars of sales representatives every one, two or three years. **(7 marks)**

Note. Ignore taxation.

43 TALEB LTD

Taleb Ltd is a manufacturing company which makes a wide range of products. One of these, the Bat, requires the use of a special Dot machine. The company's present policy is to replace each Dot machine at the end of its physical productive life of four years. The directors are now considering whether to replace the machine more frequently than once every four years in view of the fact that its productive capacity declines as it gets older and potential sales of Bats are lost. There is insufficient demand for the company's Bats to justify the purchase of a second Dot machine.

Taleb Ltd charges a selling price of CU0.12 per Bat, at which price it is able to sell up to 500,000 per annum. Variable costs, excluding machine depreciation and running costs, amount to CU0.04 per Bat. Details of productive capacities and running costs (including maintenance) of the Dot machine are as follows.

Year of machine's life	*Productive capacity (Bats)*	*Running costs* CU
First	500,000	6,000
Second	500,000	6,500
Third	400,000	7,500
Fourth	400,000	9,000

Annual running costs are independent of the number of Bats manufactured.

The directors wish to continue their present policy of always buying new Dot machines at a price of CU60,000 each. Resale values of Dot machines are CU40,000 for one-year-old machines, CU25,000 for two-year-old machines, CU10,000 for three-year-old machines and zero for four-year-old machines. The company provides depreciation on all its non-current assets using the straight line method.

All costs and revenues are paid or received in cash at the end of the year to which they relate, with the exception of the initial price of the Dot machine which is paid immediately on purchase. Taleb Ltd has an annual cost of capital of 10%.

Requirement

Prepare calculations for the directors of Taleb Ltd showing whether they should replace the Dot machine every one, two, three or four years. **(10 marks)**

Note. Ignore inflation and taxation.

Now go back to the Learning Objectives in the Introduction. If you are satisfied you have achieved these objectives, please tick them off.

Answers to Interactive questions

Answer to Interactive question 1

(a)

Time	*Cumulative cash flow*
	CU
0	(500,000)
1	(430,000)
2	(360,000)
3	(280,000)
4	(180,000)
5	(80,000)
6	40,000

∴ Payback = 5.67 years

(b) Profit calculation:

	CU
Total cash flows from operations	540,000
Total depreciation	(150,000)
Total profits	390,000
Average profits (÷ 6) =	CU65,000 p.a.

Average investment calculation

$$\frac{500,000 + 350,000}{2} = \underline{\underline{\text{CU425,000}}}$$

$$\text{ARR} = \frac{65}{425} = 15.3\%$$

(c) NPV @ 12%

Time			Discount Factor	PV
		CU'000		CU'000
0		(500)	1.000	(500.00)
1		70	0.893	62.51
2		70	0.797	55.79
3		80	0.712	56.96
4		100	0.636	63.60
5		100	0.567	56.70
6	(350 + 120)	470	0.507	238.29
			NPV	33,850

(d) NPV at 15% p.a.

Time		Discount Factor	PV
	CU'000		CU'000
0	(500)	1.000	(500.00)
1	70	0.870	60.90
2	70	0.756	52.92
3	80	0.658	52.64
4	100	0.572	57.20
5	100	0.497	49.70
6	470	0.432	203.04

at 15%	NPV =	(23,600)
at 12%	NPV =	33,850

$$\text{IRR} = 12 + \frac{33,850}{33,850 + 23,600}(15 - 12)$$

$$= 13.8\%$$

Answer to Interactive question 2

	Merits	Demerits	Rank
Payback period	• Simple to understand	• Unsophisticated	Useful as an initial

	• Quick for initial screening of projects • Considers risk (very crudely)	• No account is taken of the time value of money • Cash flows received/paid after payback are ignored	filtering device
Accounting rate of return	• Use of profit consistent with ROCE and EPS • Use of balance sheet values (asset backing) • Relative score is easy to understand	• Not consistent with wealth maximisation • No account is taken of time value of money • Percentage figure may give misleading advice when choosing between alternatives • Profits can be manipulated	Unlikely to be useful as a decision making tool
Net present value	• Takes into account the time value of money • Gives an absolute measure, allowing for comparison of projects • Considers all cash flows of projects	• The need to estimate a cost of capital • Difficulty in obtaining all relevant costs/benefits • Assumes cashflows occur at annual intervals	Technically superior technique
Internal rate of return	• Takes into account the time value of money • Represents a breakeven point so does not need an exact cost of capital • Considers all cash flows of projects	• May conflict with NPV decision • Assumes cash reinvested at IRR	Easier to use and communicate practically

The above example emphasises the idea of progression – the techniques introduced at knowledge level will be applied here to solve real world problems.

Answer to Interactive question 3

	t_0	t_1	t_2	t_3	t_4
	CU	CU	CU	CU	CU
Sales		100,000	110,000	121,000	133,100
Working capital required	15,000	16,50(	18,15(	19,96:	0
Cash flow	(15,000)	(1,50(	(1,65(	(1,81:	19,96

Answer to Interactive question 4

Now the only alternative use for the material is to sell it for scrap. To use 50 tonnes on the contract is to give up the opportunity of selling it for 50 × CU150 = CU7,500. The contract should therefore be charged with this amount.

Answer to Interactive question 5

The relevant cost of 25 tonnes is CU150 per tonne. The organisation must then purchase a further 25 tonnes and, assuming this is in the near future, it will cost CU210 per tonne.

The contract must be charged with:

	CU
25 tonnes @ CU150	3,750

25 tonnes @ CU210	5,250
	9,000

Answer to Interactive question 6

What revenue is lost if the labour is transferred to the project from doing nothing? Nothing. The relevant cost is zero.

Answer to Interactive question 7

Costs and revenues of proceeding with the project.

		CU
(1)	Costs to date of CU150,000 are sunk costs, therefore ignore.	
(2)	Materials – purchase price of CU60,000 is also sunk.	
	There is an opportunity benefit of the disposal costs saved.	5,000
(3)	Labour cost – the direct cost of CU40,000 will be incurred regardless of whether the project is undertaken or not – and so is not relevant.	
	Opportunity cost of lost contribution = 150,000 – (100,000 – 40,000)	(90,000)
	The absorption of overheads is irrelevant – it is merely an apportionment of existing costs which do not change.	
(4)	Research staff costs	
	Wages for the year	(60,000)
	Increase in redundancy pay (35,000 – 15,000)	(20,000)
(5)	Equipment	
	Deprival value if used in the project = disposal value	(8,000)
	Disposal proceeds in one year	6,000
	(All book values and depreciation figures are irrelevant)	
(6)	General building services	
	Apportioned costs – irrelevant	
	Opportunity costs of rental forgone	(7,000)
		(174,000)
	Sales value of project	300,000
	Increased contribution from project	126,000

Advice. Proceed with the project.

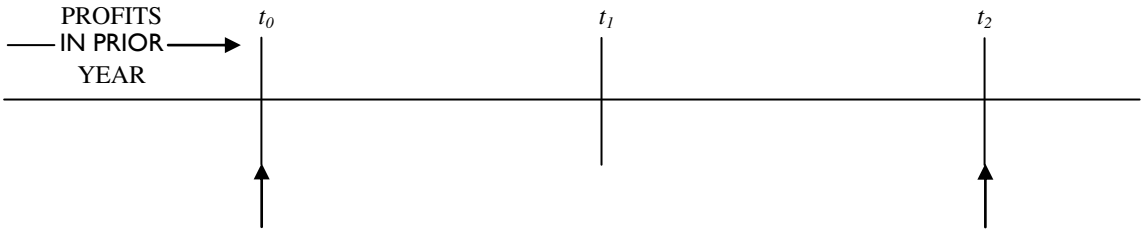
Answer to Interactive question 8

The recoverable amount is the CU900 NRV (which is higher than the CU800 economic value). As this is lower than the CU1,000 replacement cost, CU900 is the deprival value.

Answer to Interactive question 9

	t0 CU	t1 CU	t2 CU
Net trading revenue		5,000	5,000
Tax @ 21%		(1,050)	(1,050)
Asset	(10,000)		6,900
WDA (W)	378	310	(37)
Net cash flow	(9,622)	4,260	10,813

Tax computation



- Asset purchased 31 Dec 20X0
- First WDA will be set off against profits earned in y/e 31 Dec 20X0
- First tax relief at t_0

		CU	Tax relief at 21%	Timing
31 Dec 20X0	Investment in asset	10,000		
	WDA @ 18%	(1,800)	378	t0
		8,200		
31 Dec 20X1	WDA @ 18%	(1,476)	310	t1
		6,724		
31 Dec 20X2	Proceeds	6,900		
	Balancing charge	(176)	(37)	t2

- Asset scrapped 31 Dec 20X2
- No WDA in year of sale – balancing adjustment instead

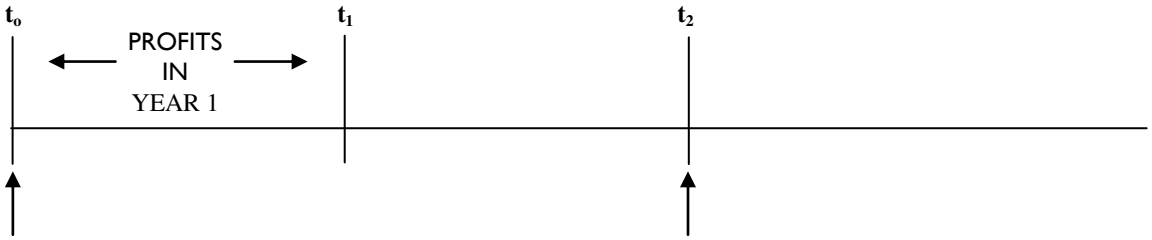
- Asset value dropped 10,000 – 6,900 3,100
- WDA claimed 1,800 + 1,476 (3,276)
- Relief reclaimed ('clawed back') 176

Answer to Interactive question 10

	t0 CU	t1 CU	t2 CU
Net trading revenue		5,000	5,000
Tax @ 21%		(1,050)	(1,050)
Asset	(10,000)		
Scrap proceeds			6,900
Tax savings on WDAs (W)		378	273
Net cash flow	(10,000)	4,328	11,123

WORKING

Tax computation



- Asset purchased 1 Jan 20X1 which is effectively (for discounting purposes) the same as 31 December 20X0, ie t_0
- First WDA will be set off against profits earned in year 1 ($t_0 \rightarrow t_1$)
- First tax relief at t_1
- Asset sold 31 Dec 20X2
- No WDA in year of sale – balancing adjustment instead

		CU	*Tax relief at 21%*	*Timing*
1 Jan 20X1	Investment in asset	10,000		
31 Dec 20X1	WDA @ 18%	(1,800)	378	t_1
		8,200		
31 Dec 20X2	Proceeds	6,900		
	Balancing allowance	(1,300)	273	t_2

Answer to Interactive question 11

	t0 CU	t1 CU	t2 CU	t3 CU
Invest	(10,000)			

Returns inflated at 7%		5,350	5,725	6,125
Net CF	(10,000)	5,350	5,725	6,125
DF @ 10%	1	0.909	0.826	0.751
PV	(10,000)	4,863	4,729	4,600

NPV = CU4,192

Answer to Interactive question 12

(1) Calculate effective rate:

$(1 + m) = (1 + e)(1 + i_s)$

$1.1 = (1 + e)(1.08)$

$e = 1.9\%$

(2) Discount perpetuity using the effective rate:

$$\frac{\text{cu}10,000}{0.019} = \text{CU526,316}$$

Answer to Interactive question 13

Replace after two years

Time	Narrative	Cash flow CU	Discount factor @ 10%	Present value CU
0	Purchase	(20,000)	1	(20,000)
1	Running costs	(5,000)	0.909	(4,545)
2	Running costs	(5,500)	0.826	(4,543)
2	Scrap proceeds	13,000	0.826	10,738
				NPV = (18,350)

$$\text{Annual equivalent} = \frac{\text{£cu}8,350}{AF_{2\text{ years@10\%}}} = \frac{\text{£cu}8,350}{1.736} = \text{CU10,570}$$

Replace after one year

Time	Narrative	Cash flow CU	Discount factor @ 10%	Present value CU
0	Purchase	(20,000)	1	(20,000)
1	Running costs	(5,000)	0.909	(4,545)
1	Scrap proceeds	16,000	0.909	14,544
				NPV = (10,001)

$$\text{Annual equivalent} = \frac{\text{£cu}10,001}{AF_{1\text{year @10\%}}} = \frac{\text{£cu}10,001}{0.909} = \text{CU11,002}$$

The machine should be replaced after two years because the cost is lower in NPV terms.

Answer to Interactive question 14

Project	*NPV ÷ outlay*	*Rank*
A	100,000 ÷ 50,000 = 2	3
C	84,000 ÷10,000 = 8.4	1
D	45,000 ÷15,000 = 3	2

Project B is rejected because of its negative NPV.

Plan:

	NPV	Funds

	CU	CU
Accept C	84,000	10,000
Accept D	45,000	15,000
		25,000
Accept ½ A	50,000	25,000
	179,000	50,000 available

The solution assumes it is possible to accept half of project A, ie projects are perfectly divisible so that half the outlay gives half the NPV, etc.

Answer to Interactive question 15

Considering X, Y and Z independently

Project	*NPV ÷ outlay*	*Rank*
X	25,000 ÷ 100,000 = 0.25	1
Y	11,000 ÷ 50,000 = 0.22	2
Z	8,000 ÷ 40,000 = 0.20	3

∴ Project X using all CU100,000 available, NPV CU25,000.

Considering X and Y + Z

Project	*NPV ÷ outlay*	*Rank*
X	25,000 ÷ 100,000 = 0.25	2
Y + Z	(11,000 + 8,000 + 4,400) ÷ (50,000 + 40,000) = 0.26	1

Plan:

	NPV CU	Funds CU
Accept Y + Z	23,400	90,000
Accept one tenth of X	2,500	10,000
	25,900	100,000

∴ Accept Y + Z + one tenth of X

Answer to Interactive question 16

Traditional accounting-based measures of management effectiveness, like the return on capital employed ratio (ROCE) and the earnings per share value (EPS), have been criticised for not focusing sufficiently on what businesses ultimately seek to do, namely to generate wealth for their shareholders.

The problem with the accounting measures is that they tend to focus on sales and profit increases, not on value generation.

For example, it is always open to a business to increase its ROCE and EPS, at least in the short term, by taking on more risky activities. Such activities may well have the effect of reducing value.

The increasing emphasis on the wealth of the shareholders as a corporate goal, has led to the emergence of ideas like shareholder value analysis (SVA). SVA is based on the totally logical principle that the value of the business overall is equal to the sum of the present values (PVs) of all of its activities. The shareholders' financial stake in the business is the value of the business, less the value of its outstanding debt. Thus if the value of the PVs of the various activities of the business can be increased, this should mean greater value for shareholders, either to be paid out as dividends or reinvested in other projects that will, in turn, result in still more shareholder value.

Answers to Self-test

1 CPV = CU(150,000 + 4,000) – (CU4,000 × 0.826)
= CU150,696

TV = CU150,696 × 1.21
= CU182,342

2

t_0 (520,000) × 1	(520,000)	
t_5 20,000 × 0.497	9,940	
		= CU244,120
$t_{1–5}$ 340,000 × 3.352	1,139,680	
$t_{0–4}$ (100,000) × (1 + 2.855)	(385,500)	

3

	t_0 CU'000	t_1 CU'000	t_2 CU'000	t_3 CU'000
Sales in the year	200	220.0	242.0	
Working capital	20	22.0	24.2	
WC cash flow	(20)	(2.0)	(2.2)	24.2
Discount factor	1	0.833	0.694	0.579
Present value	(20)	(1.7)	(1.5)	14.0

NPV = (CU9,200)
≈ (CU9,000) rounded

4 Has to be retained for use on other contracts ∴ nil cost.

5 The original purchase cost of Q is irrelevant as it is sunk.

The choice is therefore to sell Q for CU4,000 or to use it in project Y to yield contribution of

CU10,000 – CU5,000 = CU5,000.

Hence choose project Y, the relevant cost being CU5,000.

6 (a) Historic cost of CU2,750 is sunk, therefore irrelevant.

(b) Used as substitute for XB.

	CU
Purchase cost saved (100 × CU22)	2,200
Less Conversion cost	(75)
Net saving	2,125

(c) Resale value = 100 × CU20
= CU2,000

Therefore relevant cost estimate = CU2,125

7

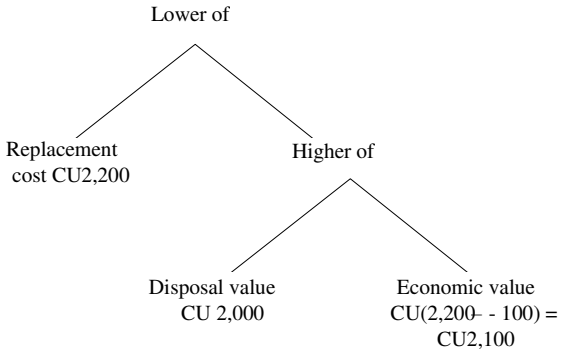
	CU
Market value 2 × CU8,000	16,000
Current resale value CU16,000 × 85%	13,600

The opportunity cost is the value of the next best alternative forgone, which is the sales proceeds of CU13,600.

8

	CU
Material X	
1,000 kg in inventory could be sold for	4,000
500 kg must be purchased for	3,000
Material Y	
Since it has alternative uses, it must be replaced for	20,000
	27,000

9 The deprival value is



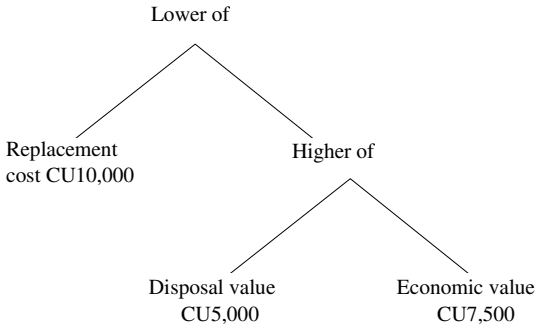
Therefore relevant cost of ZX is CU2,100 (the net saving to the company on material RP).

10 If we do not go ahead with the project the existing material will be stored with an incremental, future and cash cost of CU200. (It would not be sold for CU3,900 only to be replaced a month later at CU4,300).

If we go ahead with the project the existing inventory will be used. As it is in constant use, then we follow the cheaper option and replace it immediately at CU4,000. Storage costs of CU200 are not avoided and are therefore not incremental as a result of the decision and are not relevant.

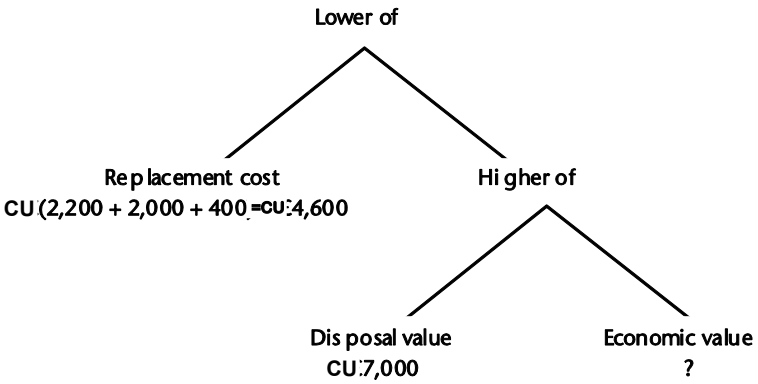
The relevant future, incremental cash cost is therefore the replacement cost of the inventory which is CU4,000.

11 The deprival value is



Therefore deprival value = CU7,500

12 The deprival value is



(The economic value is not known, but it is irrelevant, since replacement cost is lower than the disposal value.)

13 2 × CU4.20 + 3 × CU0.40 = CU9.60

14

	CU	CU
Price		10,000
Materials	3,000	
Labour	3,000	
Variable overhead	1,500	
Fixed overhead	500	
		(8,000)
Benefit from order		2,000
Lost contribution $\frac{£6}{2 \text{ hrs}}^{\text{CU}} \times 500$ hrs		(1,500)
Net profit		500

15

Tax WDV	Capital allowance	Tax saved	10% factor	PV
CU	CU	CU		CU
90,000				
(16,200)	16,200	3,402	0.909	3,092
73,800				
(13,284)	13,284	2,790	0.826	2,305
60,516				
(10,893)	10,893	2,288	0.751	1,718
49,623				
(25,000)				
24,623	24,623	5,171	0.683	3,532
PV of tax savings				10,647

16 The investment is made on 1 April 20X6, so CAs can first be set off against profits for the accounting period ended 31 March 20X7. The tax *cash* saving will therefore be at 31 March 20X7, or time 1.

Time	Date		Tax saved	time
		CU	CU	
0	1 April 20X6	2,000,000		
1	31 March 20X7			
	WDA	(360,000)	@ 21% = 75,600	1
		1,640,000		
2	31 March 20X8			
	Sale proceeds	(500,000)		
	BA	1,140,000	@ 21% = 239,400	2

Present value = (CU75,600 × 0.909) + (CU239,400 × 0.826)
= CU266,465

17 Savings are discounted at an effective ('real') discount rate of 10% as it is advantageous to have non-inflating cashflows (annuity) and the annuity tables/formula can be applied.

(1 + money rate) = (1 + effective rate) × (1 + inflation rate)

(1 + 0.155) = (1 + e) × (1+ 0.05)

(1+ e) = 1.155/1.05 = 1.1

The effective discount rate is 10%

We now need to find the non-inflated savings resulting from the saved labour hours. The current semi-skilled labour rate is CU5. This is without the effects of inflation.

PV of savings = 20,000 hours p.a. × CU5 × 6.145 (CDF 10 years at 10%)
= CU615,000

18

Time	Cash flow	DF at 21%	PV
	CU		CU
0	(50,000)	1	(50,000)
1	33,000	0.826	27,258
2	36,300	0.683	24,793
3	39,930	0.564	22,521
3	15,000	0.564	8,460
	NPV		33,032

Present value, using money cost of capital, is CU33,000 (to the nearest CU000).

Using the formula $1+ r = \frac{1+m}{1+i}$ the money cost of capital is 21%. The DF is obtained using $\frac{1}{(1+r)^n}$

The same answer could be obtained by applying the real cost of capital to flows expressed in current terms.

19

	t0	t1	t2	t3
	CU'000	CU'000	CU'000	CU'000
Equipment	(400.00)			
Revenue	–	900.00	945.00	992.25
Labour	–	(550.00)	(605.00)	(665.50)
Materials	(350.00)	–	–	–
	(750.00)	350.00	340.00	326.75
PV @ 15.5%	(750.00)	303.03	254.87	212.07

Net present value @ 15.5% = CU19,970

20 Money C of C = [(1.10 × 1.07) – 1] × 100 = 17.7%

Effective rates $\left(\frac{1.177}{1.04}-1\right) \times 100$ = 13.17%

$\left(\frac{1.177}{1.08}-1\right) \times 100$ = 8.98%

PV (CU000) = $\frac{50}{0.1317}+\frac{80}{0.0898}$ = 1,270

21 Money cost of capital = [(1.08 × 1.12) – 1] × 100
= 20.96%

Time	t0	t1	t2
	CU	CU	CU
Outlay	(13,500)		

Labour			7,000	7,700
Salvage				5,000
				12,700
20.96% discount factor	1	0.8267		0.6835
Present value	–13,500		5,787	8,680

NPV = CU970 rounded

22

	P	Q	R	S
NPV/CU of capital in restricted period	60 ÷ 20 = 3	40 ÷ 10 = 4	100 ÷ 30 = 3.3	80 ÷ 40 = 2

The optimal sequence is QRPS.

23 For individual projects the maximum NPV must be found basically by trial and error, as follows:

(a) Project H is clearly not viable, since it has a negative NPV and requires investment at t_0.

(b) It is not worthwhile considering project K unless its capital generated at t_0 is required, since it has a negative NPV.

(c) There is sufficient capital to undertake the remaining three projects without project K and so this must be optimal.

NPV = 603 + 58 + 537
= CU1,198

24 Project H is not worthwhile, whereas project J definitely is worthwhile. This leaves the following.

	NPV/CU at t_0
Project I	0.30
Project K	(0.06)
Project L	0.54

Project K could be worthwhile since the NPV lost/CU generated is less than the benefit/cost ratio of projects I and L.

	t0 Capital CU	NPV CU
Project J	(500)	58
Project L	1,000	537
Project K	(350)	(22)
$\frac{185}{200}$ Project I	1,850	558
	2,000	1,131

25 Model I every five years $\frac{50 + 4 \times 3.791}{3.791} = 17.2$

Model I every eight years $\frac{50 + 4 \times 3.791 + 30 \times 0.621 + 7 \times 2.487 \times 0.621}{5.335} = 17.7$

Model II every four years $\frac{40 + 6 \times 3.170}{3.170} = 18.6$

Model III every six years $\frac{70 + 3.5 \times 4.355}{4.355} = 19.6$

Therefore Plum Ltd should purchase model I and replace every five years.

26 NPV $= \frac{-\text{CU}\,50{,}000 + \text{CU}5{,}000 \times 0.233 - \text{CU}3{,}000 \times 2.106 - \text{CU}3{,}000 \times 2.991 \times 0.579}{3.837}$

= CU43,900 equivalent annual cost

27 MR DIPSTICK

Note		CU	CU
	Minimum tender price		

1	Material A	1,000 kgs @ CU2 – CU300	1,700	
		1,000 kgs @ CU10	10,000	
				11,700
2	Material B	1,000 kgs @ CU15		15,000
3	Material C	500 kgs (opportunity cost)		8,000
4	Material D	50 litres @ CU50		(2,500)
5	Skilled labour	1,000 hrs @ CU25		25,000
6	Semi-skilled labour	500 hrs @ CU22.50		11,250
7	Unskilled labour	500 @ CU12 (opportunity cost)		6,000
Minimum tender price				74,450

Notes

(1) Presumably the 1,000 kgs in inventory would otherwise be sold at a net gain of CU1,700. This gain is therefore forgone as a result of using this material in the contract. (Note, however, that the gain forgone is less than the cost of buying the extra 1,000 kgs.)

(2) As this material is constantly needed, the relevant cost is the cost of replacing it at the current purchase price.

(3) How would this material be used if it were not required for the contract?

Option 1 – Sell it for CU6,000.
Option 2 – Use it as a substitute and save CU8,000.

Option 2 is preferable. This is therefore the opportunity cost of using it in the contract. (Also note that this opportunity cost is much less than the cost of buying it and is therefore the correct decision.)

(4) The cost of disposing of 50 litres will be saved (@ CU50/litre, ie CU2,500). Saving this cost is a relevant benefit.

(5) The incremental cost of paying for the labour needed.

(6) The assumption is that the 1,500 spare hours have already been paid for as the workforce are on annual contracts. The additional cash flow is therefore the extra 500 hours that are needed at time and a half.

(7) For each hour diverted from their normal jobs contribution of CU2 will be forgone.

This together with the cost of paying the workers on the project amounts to a relevant cost of CU12 per kg. They would not be hired at CU20 per hr as this is more expensive.

Alternatively

This typical problem can be looked at from the point of view of incremental cash flows.

	Cash flow normally CU	*Cash flow with project* CU
Revenue per hour	12	–
Labour per hour	(10)	(10)
Contribution	2	(10)

Therefore difference in cash flow is from positive CU2 to negative CU10, ie a negative cost of CU12 per hour.

(8) Fixed overheads can be ignored as they are not incremental.

(9) Costs of preparing the tender are all sunk costs and hence must be ignored.

(10) Profit element should be ignored.

28 TINOCO LTD

(a) **NPV of new production**

Time		Cash flow CU	15% factor	Present value CU
0	Cost of site	(270,000)	1	(270,000)
1	Factory, stage payment	(1,250,000)	0.870	(1,087,500)
2	Balance for factory	(1,250,000)	0.756	(945,000)
2	Deposit for machinery	(250,000)	0.756	(189,000)
3–4	Instalment on machinery	(500,000)	1.230	(615,000)
2	Advertising	(150,000)	0.756	(113,400)
3	Advertising	(250,000)	0.658	(164,500)
4	Advertising	(100,000)	0.572	(57,200)

3–12	Variable costs	(1,600,000)	3.795*	(6,072,000)
3–12	Fixed costs	(300,000)	3.795	(1,138,500)
7	Scrap proceeds	250,000	0.376	94,000
7	Deposit for new	(250,000)	0.376	(94,000)
8–9	Instalment on new	(500,000)	0.611	(305,500)
12	Scrap proceeds	250,000	0.187	46,750
12	Value of factory	3,000,000	0.187	561,000
				(10,349,850)
3–12	Sales revenue	3,000,000	3.795	11,385,000
Positive net present value				1,035,150

* $DF_{1–12} – DF_{1–2} = 5.421 – 1.626$

(b) **Minimum selling price**

Product Z is viable provided the present value of sales revenue is at least CU10,349,850.

Annual sales revenue must be at least $\frac{\text{CU10,349,850}}{3.795}$ = CU2,727,233

Selling price must be at least $\frac{2,727,233}{400,000}$ = CU6.82

29 SHAW SECURITY SYSTEMS LTD

(a) **Investment appraisal schedule – Apollo project**

Item	t0 CU'000	t1 CU'000	t2 CU'000	t3 CU'000
Sales revenue (W1)		2,160	2,208	1,104
Materials and components (W2)		(756)	(773)	(386)
Incremental labour costs (incl overtime) (W3)		(97)	(99)	(50)
Management salaries (W4)		(48)	(48)	(48)
Lost contribution (W5)		(432)	(442)	(221)
Redundancy costs (W6)	120			(140)
Taxable cash flows	120	827	846	259
Tax (21%)	(25)	(174)	(178)	(54)
Production costs	(1,000)			
Working capital requirements (W7)	(243)	(5)	124	124
Tax saved on WDAs (W8)	38	31	25	116
Relevant cash flows	(1,110)	679	817	445
DCF (8%)	1	0.926	0.857	0.794
Present values	(1,110)	629	700	353

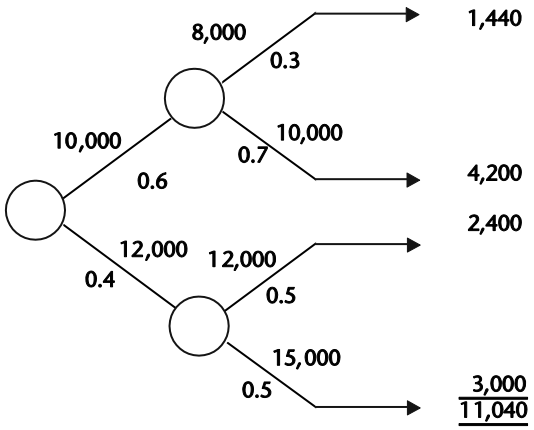
NPV of project = CU572,000

WORKINGS

(1) **Expected sales – units at CU200**

20X6 (0.6 × 10,000) + (0.4 × 12,000) 10,800 units

20X7 *Expected sales (units)*



20X8 11,040 × 50% 5,520 units

(2) **Materials and components**

	CU'000
t_1 10,800 × CU70	756
t_2 11,040 × CU70	773
t_3 5,520 × CU70	386

(3) **Incremental labour costs and overtime**

	Labour hours required by Apollo		*Labour hours released by Mercury*		*Overtime hours required by Apollo*
20X6	(10,800 × 3)	32,400	(5,400 × 4)	21,600	10,800
20X7	(11,040 × 3)	33,120	(5,520 × 4)	22,080	11,040
20X8	(5,520 × 3)	16,560	(2,760 × 4)	11,040	5,520

Therefore, incremental labour costs

		CU'000
20X6	10,800 × CU9*	97
20X7	11,040 × CU9	99
20X8	5,520 × CU9	50

*(CU6 × 150%)

(4) **Management salaries**

CU(20,000 – 8,000*) = CU12,000 × 4 = CU48,000 pa
* Consultancy fees saved/avoided as result of project.

(5) **Lost contribution from lost Mercury sales**

	Sales lost		*Gross * CPU*	CU'000
20X6	5,400	×	CU80 =	(432)
20X7	5,520	×	CU80 =	(442)
20X8	2,760	×	CU80 =	(221)

* Direct labour costs treated as a 'fixed' cost, since they will be paid whether or not Apollo is produced. Therefore, effect on cash flow of lost Mercury sale is (100 – 20) = CU80 per unit.

(6) **Redundancy costs**

t_0 CU120,000 saved at t_0 if Apollo is produced
t_3 CU140,000 incurred at t_3 if Apollo is produced.

(7) **Working capital requirements**

Sales (CU'000)	t0	t1	t2	t3
New	–	2,160	2,208	1,104
Old	–	540	552	276
	–	1,620	1,656	828
15%	243	248.4	124.2	–

∴ Cash flow effects of changes in working capital requirements are:

t_0	*t_1*	*t_2*	*t_3*
(243)	(5.4)	124.2	124.2

(8) **Tax saved on WDAs**

Time	Item		(21%) Tax saved	Timing
		CU000	CU000	
t0	Production costs	1,000		

t0**	WDA†	(180)	38*	t0
		820		
t1	WDA	(148)	31*	t1
		672		
t2	WDA	(121)	25*	t2
		551		
t3	Sale proceeds	Nil		
t3	Balancing allowance	551	116*	t3

† WDA of 18% assumed.

* Figures to nearest CU1,000 as required by question.

** Payment of CU1m occurs at end of accounting period (ie 20X5); therefore first WDA occurs at t_0.

(b) **Comments on the Apollo proposal**

Based on the above cash flow projections, the project should be accepted as it has a positive NPV.

Reservations in connection with this recommendation

(i) Demand for Apollo is subject to great uncertainty. Sensitivity analysis could be carried out to see how responsive the project's NPV is to fluctuations in the expected sales volume.

(ii) The project's sales are subject to uncertainty; consequently the Apollo project is risky and should be appraised using a discount rate reflecting this level of risk. The company's current WACC is therefore highly unlikely to be appropriate. Moreover, a suitably risk-adjusted discount rate may result in the project having a negative NPV.

(iii) How reliable are the estimates of costs? For example, Apollo sales may affect sales of the Mercury more severely than anticipated.

(iv) The attitude to risk of the directors/shareholders needs to be considered. Despite having a positive NPV the project may be considered too risky and hence be rejected.

(v) Have all costs associated with the project been identified and quantified? (Note that the project has been appraised with reference to relevant costs only – sunk costs, eg development and marketing costs, have been ignored.)

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		t0	t1	t2	t3	t4	t5
Labour		CU'000	CU'000	CU'000	CU'000	CU'000	CU'000
Skilled	10,000 × 0.5 × Nil		–				
	10,000 × 0.5 × CU4.00			20.0	20.0		
	8,000 × 0.5 × CU4.00					16.0	16.0
Unskilled	10,000 × 2 × CU2.50		50.0	50.0	50.0		
	8,000 × 2 × CU2.50					40.0	40.0
Materials							

Ping	10,000 × 2 × CU1.40	28.0	28.0	28.0			
	8,000 × 2 × CU1.40				22.4	22.4	
Pang	46,000 × 0.5 × CU1.80	41.4					
Pong	10,000 × 1.5 × CU0.80	12.0	12.0	12.0			
	8,000 × 1.5 × CU0.80				9.6	9.6	
Overheads							
Variable	10,000 × 0.5 × CU1.40		7.0	7.0	7.0		
	8,000 × 0.5 × CU1.40					5.6	5.6
Fixed							
	Rent	2.0	2.0	2.0	2.0	2.0	
	Rates		1.0	1.0	1.0	1.0	1.0
		83.4	100.0	120.0	112.0	96.6	62.6
Revenue							
	10,000 × CU18		180.0	180.0	180.0		
	8,000 × CU14					112.0	112.0
Costs (as above)		(83.4)	(100.0)	(120.0)	(112.0)	(96.6)	(62.6)
Purchase of plant		(60.0)					
Resale							6.0
Net cash flow		(143.4)	80.0	60.0	68.0	15.4	55.4
Discount factors at 15%		1.000	0.870	0.756	0.658	0.572	0.497
Present values (nearest CU000)		(143.0)	70.0	45.0	45.0	9.0	28.0

NPV = +CU54,000

Therefore, accept.

31 GIOVANNI LTD

(a) **Capital allowances**

	CU	Tax saved at 21% CU	Timing
Cost	5,000		
Year 0 WDA (18%)	(900)	189	t0
	4,100		
Year 1 WDA	(738)	155	t1
	3,362		
Year 2 WDA	(605)	127	t2
	2,757		
Year 3 WDA	(496)	104	t3
	2,261		
Year 4 Sale proceeds	–		
Balancing allowance	2,261	475	t4

(b) Investment decision

Cash flows	t0 CU	t1 CU	t2 CU	t3 CU	t4 CU
Purchase of machine	(5,000)				
Tax saved through WDAs	189	155	127	104	475
Net revenues		3,000	3,000	1,000	1,000
Tax on net revenues		(630)	(630)	(210)	(210)
	(4,811)	2,525	2,497	894	1,265
Discount factors	1.000	0.909	0.826	0.751	0.683
Present value	(4,811)	2,295	2,063	671	864

NPV = + CU1,082
Therefore accept the project.

(c) **Different timing of initial purchase**

PV of tax savings as shown above

	CU
CU189 + CU155 × 0.909 + CU127 × 0.826 + CU104 × 0.751 + CU475 × 0.683	837
Hence PV if delayed by one year CU837 × 0.909	761
Difference	76

Hence, new NPV = CU(1,082 – 76)
= CU1,006, ie project still worthwhile

Wisdom – fine if there is a balancing charge (delay it!)
– not so if there is a balancing allowance

32 SHAREHOLDER VALUE

(a) **Business decisions**

The first statement supports the view that the governing objective of a business should be to maximise shareholder value. A classic view in corporate finance, this belief has gained much recent exposure with the rise of shareholder value analysis (SVA) as a business tool. SVA suggests that all business activities, including strategic decisions and performance evaluation, should be managed with the objective of maximising the present value of the firm.

The second statement suggests that a business has a wider duty of care to a group of stakeholders who have an interest in the business. These needs should be balanced, rather than maximising the needs of a single group such as shareholders.

Certain authors have suggested that these views of business lie at opposite ends of the spectrum. This view arises from the belief that stakeholder needs conflict, and maximising one group will by necessity mean that other groups will suffer. This view is supported by high profile cases such as that of Railtrack, which was accused of abandoning customer safety in the pursuit of shareholder value.

It is true that companies have in the past made short-term, uneconomical decisions in an attempt to enhance share price that have resulted in other stakeholder groups suffering. Cost-cutting and employee downsizing decisions would be examples.

However, and as long as the long-term effects of business decisions are considered, the picture changes. Companies that consistently destroy shareholder value will find themselves starved of capital as their investors move elsewhere. Without capital they will not be able to invest in the future of their customers, employees, etc, and these groups will suffer. To deliver value to these stakeholders, long-term value will need to be delivered also to shareholders.

(b) **Shareholder value analysis**

Shareholders value the future cash returns that their investments will generate, and will also be concerned with the level of risk inherent in those investments.

The discounted cash flow (DCF) model is consistent with this type of value. It focuses on future cash flows and, by discounting them at an appropriate rate, it takes into account the investors' view of risk.

Many people believe that growth in earnings per share (EPS) is the best external measure to track shareholder value creation. This is not necessarily the case, for the following reasons.

(i) Profit is not necessarily the same as cash flow, and cannot be 'spent' by investors.

(ii) Profit can be manipulated by use of different accounting policies.

(iii) EPS is historic focused, sunk as far as investors are concerned.

(iv) EPS growth does not incorporate an adequate risk hurdle. Value is created if businesses earn more than the cost of equity. The only hurdle to be overcome before positive profit is obtained is the debt bill.

The SVA approach to business focuses on identifying 'value drivers' which, if managed correctly, can increase the PV of the firm and therefore increase shareholder value.

These drivers are as follows (choose three from seven).

(i) Sales growth rate – increasing the growth rate should generate larger future cash inflows which could translate into greater value.

(ii) Operating profit margin – increasing this, perhaps via better cost control, will generate more net cash flow from each extra sale.

(iii) Investment in non-current assets – if this outlay can be reduced without limiting effectiveness, cash will be saved and value added.

(iv) Investment in working capital – reducing working capital releases cash back into the business. If this can be done without compromising effectiveness, value will be added.

(v) Cost of capital – reducing the cost of capital, perhaps via use of debt finance, will increase the PV of the cash flow stream and therefore value.

(vi) Life of projected cash flows – if the life of a potential cash flow stream can be extended (eg via patent protection), the larger its potential to generate value.

(vii) Corporation tax rate – a lower tax rate will leave more cash available for the business. However, management's ability to affect the tax rate may be limited.

33 PACKERS LTD

NPV of contract

Final receipts = CU235,000 × $(1.10)^2$
= CU284,350

Second year labour = CU60,000 × 1.125
= CU67,500

Value of inventory of D = 2,000 × CU1.50
= CU3,000

Cost of more D = 2,000 × CU20 × 1.15
= CU46,000

	Time 0	Time 1	Time 2
	CU	CU	CU
Machinery	(75,000)		

Redundancy	2,000		
Labour		(60,000)	(67,500)
Advertising			5,000
Material D	3,000	(46,000)	
Receipts			284,350
	(70,000)	(106,000)	221,850
DF @ 15%	1	0.870	0.756
PV	(70,000)	(92,220)	167,719

Net present value = CU5,499
∴ Proceed.

34 AINSDALE LTD

(a) **Incremental NPV of moving the factory**
Existing premises

$$\text{Lease} = 450{,}000 + \frac{450{,}000}{0.1} = 4{,}950{,}000$$

$$\text{After tax} = 4{,}950{,}000 - \frac{4{,}950{,}000 \times 0.21}{1.1} = \text{CU}4{,}005{,}000$$

New premises
Cash flows

At 31 December	20X0 CU'000	20X1 CU'000	20X2 CU'000	20X3 CU'000	20X4 CU'000
Premises	(10,000)				
Machinery	(1,000)				300
Labour (W1)		1,000	(3,000)	(4,000)	(3,000)
Materials (W2)		7,750	(23,250)	(17,000)	(12,750)
Sales (W3)		(8,750)	26,250	35,000	26,250
Redundancies	(200)				
Retraining	(100)				
Tax (W4)	21	42	–	(2,940)	(2,205)
Capital allowances (W5)	38	31	25	21	32
	(11,241)	73	25	11,081	8,627
Discount factor @ 10%	1	0.909	0.826	0.751	0.683
Discounted cash flows	(11,241)	66	21	8,322	5,892

Total NPV = CU3,060,000

Overall NPV

	CU'000
NPV of lease	4,005
Per DCF statement	3,060
	7,065

WORKINGS

(1) **Labour costs**

	New factory 000 units	*Old factory* 000 units	*Incremental* 000 units	*Unit labour cost* CU	*Labour cost* CU'000
20X1	5,000	6,000	(1,000)	1.00	(1,000)
20X2	9,000	6,000	3,000	1.00	3,000
20X3	10,000	6,000	4,000	1.00	4,000
20X4	9,000	6,000	3,000	1.00	3,000

After 20X4 the sales are equivalent, so no incremental costs arise.

(2) **Material costs**

New	*Old*	*Unit material*	*Materials*

	factory	*factory*	*Incremental*	*cost*	*cost*
	000 units	000 units	000 units	CU	CU'000
20X1	5,000	6,000	(1,000)	7.75	(7,750)
20X2	9,000	6,000	3,000	7.75	23,250
20X3	10,000	6,000	4,000	4.25	17,000
20X4	9,000	6,000	3,000	4.25	12,750

After 20X4 the sales are equivalent, so no incremental costs arise.

(3) **Sales**

40% margin on sales is equivalent to a 66.67% mark-up on cost.

	Unit material cost	*Material cost*	*Labour cost*	*Total cost*	*Margin (66.67%)*	*Sales*
	CU	CU'000	CU'000	CU'000	CU'000	CU'000
20X1	4.25	(4,250)	(1,000)	(5,250)	(3,500)	(8,750)
20X2	4.25	12,750	3,000	15,750	10,500	26,250
20X3	4.25	17,000	4,000	21,000	14,000	35,000
20X4	4.25	12,750	3,000	15,750	10,500	26,250

(4) **Corporation tax**

	20X0	20X1	20X2	20X3	20X4
	CU'000	CU'000	CU'000	CU'000	CU'000
Labour		1,000	(3,000)	(4,000)	(3,000)
Materials		7,750	(23,250)	(17,000)	(12,750)
Sales		(8,750)	26,250	35,000	26,250
Redundancies/training	(100)	(200)			
Taxable profit	(100)	(200)	0	14,000	10,500
Tax payable (excl CAs)	21	42	0	(2,940)	(2,205)

(5) Capital allowances

If move premises

Year		WDA	Tax @ 21%
	CU'000	CU'000	CU'000
20X0	1,000	180	38
20X1	820	148	31
20X2	672	121	25
20X3	551	99	21
20X4	452		
Proceeds	(300)		
Balancing allowance	152	152	32

(b) **Calculation of the payback period**

	20X0	20X1	20X2	20X3	20X4	20X5
	CU'000	CU'000	CU'000	CU'000	CU'000	CU'000
Cash flows	(11,241)	73	25	11,081	8,627	
Lease	450	450	450	450	450	450
Lease tax		(95)	(95)	(95)	(95)	(95)
	(10,791)	428	380	11,436	8,982	355

Thus the payback period is three years (assuming year end cash flows).

Tutorial advice:

The likelihood of producing precisely the correct answer for requirement (a) is low, because there are many opportunities to make errors, major and minor. There are however plenty of easy marks in this question and you should be able to earn them.

Requirement (a). Make sure you approach the requirement in a logical and methodical way, as this will help build up a good total of marks. A common pitfall in this question relates to the lease of the old premises. This is perpetual, yet it is often treated as if it only lasts as long as there are incremental operating cash flows from

the move. Another common though more minor error relates to the tax payment timing. The question made clear that tax should be assumed to be paid at the end of the year to which it relates so be careful not to lag the payment a year.

35 ARCADIAN PRODUCTS LTD

(a) **Retain existing equipment or buy new**

Year	20X0	20X1	20X2	20X3	20X4
	CU'000	CU'000	CU'000	CU'000	CU'000
New plant	(12,000)				2,000
CAs (W3)	454	372	305	250	719
Old plant	3,000				
CAs (W3)	782				
	(242)	(198)	(163)	(133)	(608)
Maintenance cost					
money terms) (W1)		515	1,591	2,185	2,814
Tax thereon		(108)	(334)	(459)	(591)
	(8,006)	581	1,399	1,843	4,334
Discountfactor(W4)	1.0000	0.8826	0.7790	0.6875	0.6067
Present values	(8,006)	513	1,090	1,267	2,629

Net present value = CU(2,507,000)

Thus retaining the existing equipment would be preferable to buying new.

WORKINGS

(1) **Maintenance costs**

	20X1	*20X2*	*20X3*	*20X4*
	CU'000	CU'000	CU'000	CU'000
Maintenance (real)	500	1,500	2,000	2,500
Maintenance (money)	515	1,591	2,185	2,814

(2) **NP14 contributions**

	20X1	*20X2*	*20X3*	*20X4*
	CU'000	CU'000	CU'000	CU'000
Contributions (real)	2,500	3,500	3,500	2,500
Contributions (money)	2,575	3,713	3,825	2,814

(3) **Capital allowances**

New plant

Year		CU'000	Tax @ 21% CU'000
20X0	Cost	12,000	
	WDA	(2,160)	454
20X1		9,840	
	WDA	(1,771)	372
20X2		8,069	
	WDA	(1,452)	305
20X3		6,617	
	WDA	(1,191)	250
20X4		5,426	

	Disposal	(2,000)	
	Balancing allowance	3,426	719

Old plant

Year			Tax @ 21%
		CU'000	CU'000
20W8	Cost	10,000	
	WDA	(1,800)	
20W9		8,200	
	WDA	(1,476)	
20X0		6,724	
	Disposal	(3,000)	
	Balancing allowance	3,724	782

or

Year			Tax @ 21%
		CU'000	CU'000
20X0	WDV b/f	6,400	
	WDA	(1,152)	242
20X1		5,248	
	WDA	(945)	198
20X2		4,303	
	WDA	(775)	163
20X3		3,528	
	WDA	(635)	133
20X4		2,893	
	Disposal	0	
	Balancing allowance	2,893	608

(4) Discount factors

Year 1 $\frac{1}{(1+0.10)(1+0.03)} = 0.8826$

Year 2 $\frac{1}{(1+0.10)^2(1+0.03)^2} = 0.7790$

Year 3 $\frac{1}{(1+0.10)^3(1+0.03)^3} = 0.6875$

Year 4 $\frac{1}{(1+0.10)^4(1+0.03)^4} = 0.6067$

(b) **Viability of the NP14 product**

Year	20X0	20X1	20X2	20X3	20X4
	CU'000	CU'000	CU'000	CU'000	CU'000
Old plant	(3,000)				
CAs (W3)	(782)				
	242	198	163	133	608
Contributions (money terms) (W2)		2,575	3,713	3,825	2,814
Tax thereon		(541)	(780)	(803)	(591)
Maintenance costs (money terms) (W1)		(515)	(1,591)	(2,185)	(2,814)
Tax thereon		108	334	459	591
Working capital	(257)	(114)	(11)	101	281
	(3,797)	1,711	1,828	1,530	889
Discount factor (W4)	1.0000	0.8826	0.7790	0.6875	0.6067
Present values	(3,797)	1,510	1,424	1,052	539

Net present value = CU728,000

Thus using the existing equipment to produce NP14s would be viable.

Tutorial note:

A common pitfall on this question is confusing 'real' and 'money' values in the same assessment. Either approach is equally correct, but it must be applied consistently in the same assessment. In practice the 'money' approach tends to be less difficult to apply.

In part (a), be careful not to overlook the balancing allowance that would arise should the existing equipment be sold.

36 JUNO PRODUCTS LTD

(a) **Modification decision**

31 December	Timing 20X8 0 CU'000	20X9 1 CU'000	20Y0 2 CU'000
Modification costs	(8,000)		
Extra contribution (excluding one bought-in part) 200 units per annum × CU25,000 per unit (W1)		5,000	5,000
Extra parts to be bought (400 × 1,000) (W1)			(400)
	(8,000)	5,000	4,600
Tax effect at 21%	1,680	(1,050)	(966)
	(6,320)	3,950	3,634
Discount factors @ 5%	1	0.952	0.907
Present value	(6,320)	3,760	3,296

NPV = 736 > 0
The modification should take place.

(b) Relevant CFs if continue

31 December	20X8 0 CU'000	20X9 1 CU'000	Timing of cash flows 20Y0 2 CU'000	20Y1 3 CU'000	20Y2 4 CU'000
Modification costs	(8,000)				
Contribution (excluding bought-in part) (W2)		11,500	11,500	5,200	3,900
Cost of extra parts			(400)	(400)	(300)
Opportunity cost of parts	(600)				
Overheads that would be avoided if production ceased (lease cost Unavoidable)		(2,000)	(2,000)	(2,000)	(2,000)
Annual taxable net revenues	(8,600)	9,500	9,100	2,800	1,600
Tax @ 21%	1,806	(1,995)	(1,911)	(588)	(336)
Plant and equipment Disposal proceeds avoided	(6,000)				
Balancing allowance avoided (W3)	(462)				
Tax re WDAs if continue (W3)	310	254	209	171	778
Net CFs	(12,946)	7,759	7,398	2,383	2,042
DF @ 5%	1	0.952	0.907	0.864	0.823
PV	(12,946)	7,387	6,710	2,059	1,681

NPV = 4,891 > 0 therefore continue
WORKINGS

(1) Contribution per unit for modification decision

	CU
Selling price	35,000
Labour	(4,000)
Materials (excluding the component type that is in inventory)	(6,000)
	25,000

There are enough bought-in parts in inventory to make 1,000 units. This will cover the first two years of production if no modifications are made in the first year, and 300 units worth of production in the second year if modifications are made. Thus an additional 400 units of parts would have to be bought in year 2 if modifications were to take place.

(2) **Contributions per unit (excluding bought-in part)**

Years 1 and 2 First 500 units – need to take into account lost contribution from other products that could have been sold.

	CU
Selling price	35,000
Labour (4,000 × 4)	(16,000)
Materials	(6,000)
	13,000

Additional 200 units do not affect sales of the other product, therefore use contribution per unit of CU25,000 as in (1) above.

Years 3 and 4 All units have contribution of CU13,000 per unit as calculated above.

Therefore contribution figures in total are:

	CU'000
Year 1 500 × 13 + 200 × 25	11,500
Year 2 500 × 13 + 200 × 25	11,500
Year 3 400 × 13	5,200
Year 4 300 × 13	3,900

(3) Balancing allowance if sold on 31 December 20X8

Accounting period	Narrative	CU000	Tax relief	Timing
20X7	Bought	10,000		
	WDA @ 18%	(1,800)		
20X8		8,200		
	Disposal proceeds	6,000		
	Balancing allowance	(2,200)	Tax saving @ 21% = 462	t0

WDAs if kept

Accounting period	Narrative	CU000	Tax relief @21%	Timing
20X8	B/f	8,200		
	WDA @ 18%	(1,476)	310	t0
20X9		6,724		
	WDA @ 18%	(1,210)	254	t1
20Y0		5,514		
	WDA @ 18%	(993)	209	t2
20Y1		4,521		
	WDA @ 18%	(814)	171	t3
20Y2		3,707		
	Disposal proceeds	0		
	Balancing allowance	(3,707)	778	t4

(c) **Discount rate**

The long-term after-tax borrowing rate is not a suitable discount rate for the following reasons.

- It completely ignores the views and requirements of shareholders. The role of directors is to make the shareholders wealthy, so a discount rate should be used that incorporates their required return or cost of equity. Most firms do this by using a weighted average cost of capital (WACC).
- It is a risk-free (or at least a very low risk) discount rate. The project cash flows are uncertain, so a higher discount rate should be used to reflect this. In particular, changes in risk – due to changes

in the type of activity undertaken or due to changes in gearing – need to be incorporated. Again, looking at the cost of equity could help.

Tutorial note:

A good answer would correctly deduce whether it would be economically beneficial to modify a product which would have the effect of increasing market demand for it (requirement (a)). It would then correctly assess a decision on the cessation of manufacture of the products, taking account of the decision in requirement (a) (requirement (b)). It would then go on to comment appropriately on the suitability of the discount rate suggested in the question (requirement (c)).

For requirement (a) one complicated way of attacking the requirement is to carry out two sets of calculations, one assuming the modification would take place and the other assuming that it would not. This is a complicated way of dealing with the modification question which is more likely to lead to errors. Simply picking up the cash flow differentials between each of the cases is a more straightforward approach.

A common pitfall in this question is to omit the cashflows associated with operating costs and/or tax, both of which varied with the decision.

In requirement (b) if you organise your answers in a logical way you should correctly pick up the relevant areas of cash flows. Make sure that if you (correctly) concluded in requirement (a) that modification should take place, don't ignore this in part (b).

37 REXAL LTD

(a) **Net present value calculations**

Option 1

Time	0	1	2	3
31 December	20X0	20X1	20X2	20X3
	CU	CU	CU	CU
Capital outlay	(80,000)			
Scrap proceeds				8,000
Net cash inflows		60,000	74,000	88,000
Tax on net inflows		(12,600)	(15,540)	(18,480)
Writing down Allowances (W1)		3,024	2,480	9,616
Working capital	(6,000)	(1,400)	(1,400)	8,800
Net cash flow	(86,000)	49,024	59,540	95,936
Discount factor (W2)	1	0.791	0.636	0.522
	(86,000)	38,778	37,867	50,079

NPV = CU40,724

Option 2

Time	0	1	2	3
31 December	20X0	20X1	20X2	20X3
	CU	CU	CU	CU
Opportunity cost – disposal proceeds forgone (W3)	(30,000)			
Balancing charge avoided (W3)		6,300		
Net cash inflows (W4)		35,000	46,600	58,776
Tax on inflows		(7,350)	(9,786)	(12,343)
Working capital	(3,500)	(1,160)	(1,218)	5,878
Net cash flow	(33,500)	32,790	35,596	52,311

Discount factor (W2)	1	0.791	0.636	0.522
	(33,500)	25,937	22,639	27,306

NPV = CU42,382

Both projects show a positive NPV. Since they are mutually exclusive, option 2 should be preferred since it has the higher NPV.

(b) **Reservations**

Reservations in basing an investment decision on these figures concern the accuracy of the data and the inherent assumptions.

(i) How reliable are the estimates of operating cash flows?

(ii) Are estimates of scrap proceeds appropriate?

(iii) Is the working capital requirement sufficient?

(iv) Operating cash flows have allowed for inflation. These values can change significantly if the estimates of inflation are incorrect.

(v) The real cost of capital is 15%. How reliable is this figure and should it remain static over the life of the project?

(vi) All cash flows are assumed to arise at the year end. Is this appropriate?

(vii) Will the tax rates assumed and the available capital allowances materialise in the future? Clearly it is difficult to predict with certainty the Government's future budgets.

(viii) The ultimate NPVs are fairly similar and make any decision taken between the projects somewhat marginal.

WORKINGS

(1) **Option 1 – WDAs**

A/c period ended		CU		CU	Time
31 Dec 20X1	Investment	80,000			
	WDA at 18%	(14,400)	Tax saved at 21%	3,024	1
		65,600			
31 Dec 20X2	WDA at 18%	(11,808)	Tax saved at 21%	2,480	2
		53,792			
31 Dec 20X3	Scrap proceeds	(8,000)			
Bal allowance		45,792	Tax saved at 21%	9,616	3

(2) Calculation of discount factors

Because the cash flows in the question are given in money terms (or, in the case of the machine maintenance, costs that can easily be converted into money terms) the most efficient discounting method is to discount net monetary values at a money cost of capital.

(**Note** An alternative is to convert all money terms into current terms and then discount at the real rate, but this would be a far less efficient approach and is definitely not recommended.)

Using the relationship

$1 + m = (1 + r)(1 + i)$ where m = money cost of capital
r = real cost of capital
i = inflation rate,

then, money cost	for 20X1	= (1.15) × (1.1) – 1 = 0.265, ie 26.5%
	for 20X2	= (1.15) × (1.08) – 1 = 0.242, ie 24.2%
	for 20X3	= (1.15) × (1.06) – 1 = 0.219, ie 21.9%
	for 20X4	= (1.15) × (1.04) – 1 = 0.196, ie 19.6%

The discount factors are as follows

Time 1 (31 Dec 20X1)	$\frac{1}{1.265}$	= 0.791
Time 2 (31 Dec 20X2)	$\frac{1}{1.265} \times \frac{1}{1.242}$	= 0.636
Time 3 (31 Dec 20X3)	$\frac{1}{1.265} \times \frac{1}{1.242} \times \frac{1}{1.219}$	= 0.522

Time 4 (31 Dec 20X4) $\frac{1}{1.265} \times \frac{1}{1.242} \times \frac{1}{1.219} \times \frac{1}{1.196}$ = 0.437

(3) **Option 2 – Capital cost**

This option utilised an existing machine. The cost to the business is the opportunity cost of the sale proceeds forgone at 1 January 20X1 (ie Time 0).

However, by not selling the machine a balancing charge of CU30,000 × 0.21 = CU6,300 is avoided. This flow would have arisen on 31 December 20X1 (ie Time 1) and not 31 December 20X0, since the asset was to be sold on the first day of an accounting period.

(4) **Option 2 – Net cash inflows**

	20X1 CU		20X2 CU		20X3 CU
Per question (Option 1)	60,000		74,000		88,000
Less: Additional machine costs	(5,000)	× 1.08 =	(5,400)	× 1.06 =	(5,724)
Lost contribution	(20,000)		(22,000)		(23,500)
	35,000		46,600		58,776

38 SOUTHSEA LTD

(a)

	20X1 CU	20X2 CU	20X3 CU	20X4 CU	20X5 CU	20X6 CU
Incr. Rev (W1)	-	127,500	416,160	745,493	1,131,462	1,266,750
Components (W2)	-	(59,400)	(188,160)	(327,084)	(477,342)	(513,450)
Labour (W3)	-	(15,000)	(48,000)	(84,300)	(124,200)	(135,000)
Cash flows	-	53,100	180,000	334,109	529,920	618,300
Tax @ 21%	-	(11,151)	(37,800)	(70,163)	(111,283)	(129,843)
Investment	(2,000,000)					
CA (W4)	75,600	61,992	50,833	41,683	34,180	155,711
NC	(1,924,400)	103,941	193,033	305,629	452,817	644,168
DF (W5)	1	0.916	0.840	0.769	0.698	0.633
PV	(1,924,400)	95,210	162,148	235,029	316,066	407,758
NPV	(708,189)					

On the basis of this negative NPV, the recommendation should be to reject the investment.

WORKINGS

W1: Sales (units):	20X2	20X3	20X4	20X5	20X6
With new facilities	1,100	1,210	1,331	1,464	1,500 (max.)
With old facilities	1,050	1,050	1,050	1,050	1,050
Increase in unit sales	50	160	281	414	450
Revenue:					
Selling price/unit: (CU)	2,550	2,601	2,653	2,733	2,815
Incremental revenue	127,500	416,160	745,493	1,131,462	1,266,750
W2: Components:					
Cost/unit	1,188	1,176	1,164	1,153	1,141
Incremental cost	(59,400)	(188,160)	(327,084)	(477,342)	(513,450)
W3: Labour:					
Labour (units × CU300)	(15,000)	(48,000)	(84,300)	(124,200)	(135,000)

Gross Figures would have been as follows (in CU):

Revenue:

	20X2	20X3	20X4	20X5	20X6
With new facilities	2,805,000	3,147,210	3,531,143	4,001,112	4,222,500
Without facilities	2,677,500	2,731,050	2,785,650	2,869,650	2,955,750
	127,500	416,160	745,493	1,131,462	1,266,750

Components:

	20X2	20X3	20X4	20X5	20X6
With new facilities	1,306,800	1,422,960	1,549,284	1,687,992	1,711,500
Without facilities	1,247,400	1,234,800	1,222,200	1,210,650	1,198,050
	(59,400)	(188,160)	(327,084)	(477,342)	(513,450)

Labour:

	20X2	20X3	20X4	20X5	20X6
With new facilities	330,000	363,000	399,300	439,200	450,000
Without facilities	315,000	315,000	315,000	315,000	315,000
	(15,000)	(48,000)	(84,300)	(124,200)	(135,000)

W4: Capital Allowances:		CU	CA (21%) CU
31 Dec 20X1	Cost	2,000,000	
31 Dec 20X1	WDA	360,000	75,600
		1,640,000	
31 Dec 20X2	WDA	295,200	61,992
		1,344,800	
31 Dec 20X3	WDA	242,064	50,833
		1,102,736	
31 Dec 20X4	WDA	198,492	41,683
		904,244	
31 Dec 20X5	WDA	162,764	34,180
31 Dec 20X6	Bal. All.	741,480	155,711

W5: Discount Factors:
20X2: 1/(1.07 × 1.02) = 1/1.0914 = 0.916
20X3: 1/1.09142 = 0.840
20X4: 1/1.09143 = 0.769
20X5: 0.769 × 1/(1.07 × 1.03) = 0.769 × 1/1.1021 = 0.698
20X6: 0.769 × 1/1.10212 = 0.633

(b) The obvious problem is that the negative NPV arises principally because the almost 50% increase in production capacity is not fully used until the final year of the project. However, the investment in additional production capacity therefore comes with the real option of finding new customers for the spare capacity in the first four years of the contract.

This is an example of a 'follow-on' (growth) option and if this could be achieved then the whole project has the potential to be financially viable from a shareholder wealth perspective.

(c) Synergistic savings may be achieved (administration, leaner management structures)

Risk reduction (lower risk may create a lower WACC)

Backward vertical integration gives control over supply (quantity/quality)

39 RFA LTD

(a)

	20X9 t0 CU	20Y0 t1 CU	20Y1 t2 CU	20Y2 t3 CU
New machine	(1,700,000)			200,000
CA's on new machine (W1)	64,260	52,693	43,208	154,838
Old machine (W2)	79,000		(63,200)	
Sales (W3)		545,900	901,765	1,442,400
Raw materials (W4)		(79,800)	(125,685)	(183,368)
Other variable costs (W5)		(53,560)	(117,760)	(259,632)
Wages (W6)		18,360	18,727	(140,079)
Tax (W7)		(90,489)	(142,180)	(180,457)
Working capital (W8)	(54,590)	(35,587)	(54,063)	144,240
Total cash flows	(1,611,330)	357,517	460,812	1,177,942
Discount at 11%	1.000	0.901	0.812	0.731
PV	(1,611,330)	322,123	374,179	861,076
NPV	(53,952)			

The NPV is negative and so RF 17 should not be purchased as this would reduce shareholder wealth.

WORKING

(1)

	t0	t1	t2	t3
	CU	CU	CU	CU
Cost	1,700,000	1,394,000	1,143,080	937,326
WDA @ 18%	(306,000)	(250,920)	(205,754)	(737,326)
WDV	1,394,000	1,143,080	937,326	200,000
Capital Allowances @ 21%	64,260	52,693	43,208	154,838

(2)

	CU	CU	CU	CU
RF13 resale value	100,000		(80,000)	
Balancing charge	(21,000)		16,800	
	79,000		(63,200)	

(3)

	CU	CU	CU
Sales RF17 (real)	1,150,000	1,450,000	1,320,000
Sales RF13 (real)	620,000	600,000	0
Increase (real)	530,000	850,000	1,320,000
Inflation	1.030	1.061	1.093
Increase (money)	545,900	901,765	1,442,400

(4)

	CU	CU	CU
Raw materials RF17 (real)	(138,000)	(174,000)	(158,400)
Raw materials RF13 (real)	(62,000)	(60,000)	0
Increase (real)	(76,000)	(114,000)	(158,400)
Inflation	1.050	1.103	1.158
Increase (money)	(79,800)	(125,685)	(183,368)

(5)

	CU	CU	CU
Other VC RF17 (real)	(207,000)	(261,000)	(237,600)
Other VC RF13 (real)	(155,000)	(150,000)	0
Increase (real)	(52,000)	(111,000)	(237,600)
Inflation	1.030	1.061	1.093
Increase (money)	(53,560)	(117,760)	(259,632)

(6)

	CU	CU	CU
Labour saving (real) [CU150,000 × 12%]	18,000	18,000	18,000
Inflation	1.020	1.040	1.061
Labour saving (money)	18,360	18,727	19,102
Labour cost for extra year [150,000 × 1.023]	0	0	(159,181)

Net saving/(cost)	18,360	18,727	(140,079)

(7)

	CU	CU	CU
Sales (W3)	545,900	901,765	1,442,400
Raw materials (W4)	(79,800)	(125,685)	(183,368)
Other variable costs (W5)	(53,560)	(117,760)	(259,632)
Wages (W6)	18,360	18,727	(140,079)
Taxable profits	430,900	677,047	859,321
Tax @ 21%	(90,489)	(142,180)	(180,457)

(8)

	CU	CU	CU	CU
Working capital required (sales × 10%)		54,590	90,177	144,240
Investment	(54,590)	(35,587)	(54,063)	144,240

(b) Sensitivity analysis considers the degree of sensitivity of forecasts. It calculates the change necessary for a project to break even.

(i) It is a simple approach and identifies those areas which are critical to the success of a project. It enables management to decide the likelihood of the possible outcomes under consideration.

(ii) However, it assumes that changes to variables can be made independently of other variables.

(iii) It ignores probability.

(iv) It does not point directly to the correct decision.

The expected value is an average of possible outcomes, weighted by the probability of each outcome occurring.

(i) Thus the information is reduced to a single number for each choice.

(ii) However it may be difficult to estimate the probabilities of the possible outcomes.

(iii) The average may not correspond to any of the possible outcomes.

(iv) The average ignores risk as it gives no indication of the spread of possible results.

40 STICKY FINGERS LTD

(a) No rationing

		Present values			
Year	0	1	2	3	4
Time	t0	t1	t2	t3	t4
Discount factor	1	0.870	0.756	0.658	0.572
	CU'000	CU'000	CU'000	CU'000	CU'000
Project A	(1,500)	(435)	907	395	172
Project B	(2,000)	(870)	1,890	1,645	1,430
Project C	(1,750)	435	832	921	572
Project D	(2,500)	609	680	855	172
Project E	(1,600)	(435)	151	1,842	1,316

	NPV
	CU'000
Project A	(461)
Project B	2,095
Project C	1,010
Project D	(184)
Project E	1,274

Therefore, accepting all projects with a positive NPV, accept projects B, C and E

(b) Single-period capital rationing

Project	A	B	C	D	E
NPV (CU000)	(461)	2,095	1,010	(184)	1,274
Investment, t0 (CU000)	1,500	2,000	1,750	2,500	1,600
NPV/CU	–	CU1.05	CU0.58	–	CU0.80

Rank	–	1st	3rd	–	2nd

Therefore, accept B and 10/16 E.

(c) Single-period capital rationing – inflows and outflows, negative NPVs

Using benefit cost ratios $\frac{\text{NPV}}{\text{initial investment}}$

	Benefit/cost	NPV per CU1 invested	Ranking
Project A			*
Project B	CU2,095/CU1,000	CU2.10	2
Project C			*
Project D	CU(184)/CU700	CU(0.26)	**
Project E	CU1,274/CU500	CU2.55	1

Notes

* Project A would never be accepted because it has a negative NPV and uses up funds in the restricted year.

Project C would always be accepted since it has a positive NPV and releases funds in the restricted year. A total of CU700,000 is then available.

** Project D has a negative NPV but releases funds at t1.

If project D is accepted, this makes an extra CU700,000 available at t1. However, in doing so a negative NPV (–CU184,000) is incurred. Thus, it is necessary to examine whether the extra positive NPV generated by the additional investment finance outweighs this cost.

(1) Available capital = CU200,000. Accept projects C, E and 20% B. Total NPV = CU2,703,000.

(2) If D is accepted the available capital becomes CU1,400,000 [CU200,000 + CU500,000 (from project C) + CU700,000 (from project D)].

Accept projects C, D, E and 90% B. Total NPV = CU3,985,500. This is the optimal solution.

(d) Indivisible projects

Possible investment 'portfolios' are

B or C or E or (C and E)

The portfolio which has the highest NPV is C and E requiring an investment of CU3.35 million and generating CU2.3 million.

41 IGLOO LTD

(a) No capital rationing

Accept all projects with NPV ≥ 0.

	NPV CU'000	
Project A	+ 60	
Project B	+ 40	
Project C	– 20	Therefore accept A, B, D and E
Project D	+ 110	
Project E	+ 40	

(b) Single period capital rationing

Using benefit cost ratios (NPV/CU) $\frac{\text{NPV}}{\text{initial investment}}$

		NPV/CU	Rank
Project A	+ 60 ÷ 100	= 0.60	3
Project B	+ 40 ÷ 50	= 0.80	2
Project C	– 20 ÷ 200	= (0.10)	5
Project D	+ 110 ÷ 100	= 1.10	1
Project E	+ 40 ÷ 200	= 0.20	4

CU225,000 available, therefore accept D, B, ¾ A.

(c) Mutually-exclusive investments

This problem is solved by trial and error, using the rankings from (b) above.

The two alternative project combinations are as follows,

D, B, 371/2 % E: NPV (CU000) = 110 + 40 + 15 = 165
D, A, 121/2 % E: NPV (CU000) = 110 + 60 + 5 = 175

Therefore the better combination is D, A and 12½ % E.

(d) Integer restrictions

Again trial and error is required.

Possible combinations, given the limited finance available, are as follows.

A and B; A and D; B and D; or any single project.

Examining all the different whole project combinations shows that A and D produce the maximum amount of total NPV, the amount being CU170,000.

(e) Restrictions with inflows, outflows and negative NPVs

Recalculating the benefit-cost ratios, now using t1 outlays.

		NPV/CU	Rank
Project A	+ 60 ÷ 100	= 0.60	3
Project B	+ 40 ÷ 100	= 0.40	4
Project C	– 20 ÷ (100)	= 0.20*	?
Project D	+ 110 ÷ 50	= 2.20	1
Project E	+ 40 ÷ 50	= 0.80	2

It is worth simplifying the problem with some rational analysis.

In this case not much can be done. However, it may be that some projects can automatically be eliminated (with negative NPVs and using up funds in the restricted year). It may also happen that some projects can be automatically elected (with positive NPVs and providing additional funds in the restricted year). Here the problem concerns C (negative NPV but providing funds for time 1).

If project C is accepted, this makes an extra CU100,000 of investment finance available at t1. However, in doing so a negative NPV (– CU20,000) is incurred. Thus one must consider whether the extra positive NPV generated by the additional investment finance outweighs this cost.

CU150,000 of capital, accept D, E and 1/2 A. Total NPV = CU180,000.

CU150,000 + CU100,000 of capital, accept D, E, A, 1/2 B and C. Total NPV = CU(110,000 + 40,000 + 60,000 + 20,000 – 20,000) = CU210,000. This is the optimal combination.

Having found that, with CU150,000 available, the 'money dries up' half way through project A, it is clear by comparing A's NPV/CU of CU0.60 with C's (strange) NPV/CU of CU0.20, that every CU1 C provides at time 1 increases the NPV by a net CU0.40. It is also worth using C to supply funds for project B.

42 STAN BELDARK

Optimal replacement period

The effects of increasing running costs and decreasing resale value have to be weighed up against capital cost. Road fund licence etc can be ignored, since Stan will always pay CU300 per year per car.

The following table is one of the quickest ways to reach an answer.

	Running cost CU	PV of RC CU	Cum PV of RC CU	Resale value CU	PV of RV CU	NPV of car CU	Cum discount factor	EAC CU
Life 1	3,000	2,727	2,727	3,500	3,182	5,045*	0.909	5,550
Life 2	3,500	2,891	5,618	2,100	1,735	9,383	1.736	5,405
Life 3	4,300	3,229	8,847	900	676	13,671	2.487	5,497

* NPV = 5,500 cost + 2,727 running cost – 3,182 resale value = CU5,045

From the above table it can be seen that the optimal replacement period is every two years.

43 TALEB LTD

Summary showing the optimal replacement policy for Taleb's Dot machines

Replacement cycle	Annual equivalent net revenue CU'000
One year	8.0
Two years	11.1 *
Three years	9.8
Four years	10.3

* optimal policy. Replacement of the Dot machine every two years results in the greatest annual equivalent net revenue for the company (ie CU11,100) and therefore is the recommended replacement policy.

WORKINGS

Annual production/sales (units)	500,000	400,000
	CU	CU
Annual revenue (CU0.12 per unit)	60,000	48,000
Less Annual variable costs (CU0.04 per unit)	(20,000)	(16,000)
Contribution	40,000	32,000

(1) One year replacement

	Year 0 CU'000	Year 1 CU'000
Machine outlay	(60)	
Scrap value		40
Running costs		(6)
Contribution		40
Net cash flow	(60)	74

Net present values = –60 + 74 × 0.909
= 7.266

Annual equivalent = 7.266 ÷ 0.909
≡ CU7,993

(2) Two year replacement

	Year 0 CU'000	Year 1 CU'000	Year 2 CU'000
Machine outlay	(60.0)		
Scrap value			25.0
Running costs		(6.0)	(6.5)
Contribution		40.0	40.0
Net cash flow	(60.0)	34.0	58.5

Net present values = –60 + 34 × 0.909 + 58.5 × 0.826
= 19.227

Annual equivalent = 19.227 ÷ 1.736
≡ CU11,075

(3) Three year replacement

	Year 0 CU'000	Year 1 CU'000	Year 2 CU'000	Year 3 CU'000
Machine outlay	(60.0)			
Scrap value				10.0
Running costs		(6.0)	(6.5)	(7.5)
Contribution		40.0	40.0	32.0
Net cash flow	(60.0)	34.0	33.5	34.5

Net present values = –60 + 34 × 0.909 + 33.5 × 0.826 + 34.5 × 0.751
= 24.4865

Annual equivalent = 24.4865 ÷ 2.487
≡ CU9,846

(4) Four year replacement

	Year 0	Year 1 CU'000	Year 2 CU'000	Year 3 CU'000	Year 4 CU'000
Machine outlay	(60.0)				
Scrap value					0
Running costs		(6.0)	(6.5)	(7.5)	(9.0)
Contribution		40.0	40.0	32.0	32.0
Net cash flow	(60.0)	34.0	33.5	24.5	23.0

Net present values = –60 + 34 × 0.909 + 33.5 × 0.826 + 24.5 × 0.751 + 23 × 0.683
= 32.6855

Annual equivalent = 32.6855 ÷ 3.170
≡ CU10,311

Tutorial note:

The notable feature of this question is that it involves revenues as well as costs in the replacement decision. Several approaches can be taken but the above is probably the simplest. Other approaches, including the opportunity cost of contribution forgone, are acceptable and, although they will produce different figures, they should give the same ranking.

CHAPTER 3

Risk and decision making

Introduction

Examination context

Topic List

Introduction

Learning objectives

	Tick off
• To understand the shortcomings of investment appraisal techniques and how these are addressed practically	☐
• To take account of uncertain outcomes by making use of expected values	☐
• To appreciate the benefits of diversification and the resultant analysis of risk which is possible	☐
• To be able to price systematic risk using the CAPM in determining a required rate of return	☐

The syllabus references that relate to this chapter are 1j, 3e, f, h.

Syllabus links

This topic is taken forward at advanced level at a higher technical level, and in the case study where the ideas are applied pragmatically.

Examination context

In the exam you may be asked to take into account uncertainty either by commenting upon the reasonableness of the estimates made, or by adjusting the required rate of return to reflect risk.

1 Introduction to risk and uncertainty

Section overview

- All business decisions are based on forecasts.
- All forecasts are subject to varying degrees of uncertainty.
- Consideration needs to be given as to how uncertainty can be reflected in financial evaluations.

There is possibly an upside to a decision – things may go better than expected (upside risk or potential). On the other hand, there may be a downside where things go worse than expected (downside risk). Shareholders are likely to be risk averse. This does not mean that they will not accept the potential downside to projects (in order to avoid downside completely a firm would have to undertake no projects at all) but it does mean that they will expect to be compensated for taking risks, ie the greater the risk taken, the higher the returns required.

Some authors draw a distinction between risk and uncertainty as explained below.

1.1 Risk

When making a business decision, outcomes normally depend on the happening of various external events beyond the firm's control. Decisions are usually said to be subject to risk if, although there may be several possible outcomes, both these outcomes and their probabilities (ie the likelihood of each possible outcome actually occurring) are known.

For example, the toss of a coin or the roll of the dice.

1.2 Uncertainty

It is quite likely that future outcomes cannot be predicted with much confidence from available data. It is particularly the case that probabilities of various outcomes will be unknown.

Decisions are usually said to be subject to uncertainty if possible outcomes are known but probabilities are unknown.

For example, most business decisions.

Although there is a clear distinction between these two problems, in practice the words 'risk' and 'uncertainty' are used interchangeably.

1.3 Methods of dealing with decision making under risk and uncertainty

Risk is best handled by using probability distributions, expected values, simulation, portfolio theory, the capital asset pricing model and risk-adjusted discount rates. All of these are dealt with later in this chapter.

Techniques for handling uncertainty are generally more crude but practically just as useful. These include the following:

(a) Setting a minimum payback period for projects

(b) Increasing the discount rate subjectively in order to submit the project to a higher 'hurdle' rate in investment appraisal

(c) Making prudent estimates of outcomes to assess the worst possible situation

(d) Assessing both the best and the worst possible situations to obtain a range of outcomes

(e) Using sensitivity analysis to measure the 'margin of safety' on input data (see next section)

2 Sensitivity analysis

Section overview

- How sensitive is the decision to the individual forecasts made?
- Technique is to take each forecast in turn and find the change needed that would cause the project to

breakeven.

2.1 Introduction

Investment involves expenditure now in return for a stream of future returns. The investment could be in the form of physical assets (capital budgeting or working capital management) or securities. As in most decision-making situations data is based on forecasts which are subject to varying degrees of uncertainty. The task in investment appraisal involves deciding whether the uncertain cost of the investment is outweighed by its uncertain benefits.

2.2 Basic principle

Sensitivity analysis is a formalised approach to incorporating alternative forecasts in the project evaluation. The technique is to take each uncertain forecast one by one, and calculate the change necessary for the NPV to fall to zero, ie this is essentially breakeven analysis in NPV terms. Breakeven analysis was introduced in Management Information.

If sensitivity analysis is to be carried out, it is often useful to calculate net present values in such a way that PVs are found of individual elements of costs and revenues over the life of the project. This means that the tabular approach with headings 'Time', 'Cash flow', 'Discount factor', 'Present value ' may be preferred, unless it becomes very cumbersome.

Worked example: Sensitivity analysis

Butcher Ltd is considering whether to set up a division in order to manufacture a new product, the Azam. The following statement has been prepared, showing the projected profitability per unit of the new product.

		CU	CU
Selling price			22.00
Less	Direct labour	5.00	
	Material 3 kg @ CU1.50 per kg	4.50	
	Variable overheads	2.50	
			(12.00)
Net contribution per unit			10.00

It is expected that 10,000 Azams would be sold each year at the above selling price. Demand for Azams is expected to cease after five years. Direct labour and material costs would be incurred only for the duration of the product life.

Other overheads have been calculated as follows.

	CU
Rent	8,000
Salary	5,000

Manufacture of the Azam would require a specialised machine costing CU250,000.

The cost of capital of Butcher Ltd is estimated at 5% pa in real terms. Assume all costs and prices given above will remain constant in real terms. All cash flows would arise at the end of each year, with the exception of the cost of the machine which would be payable immediately.

Requirements

(a) Prepare net present value calculations, based on the estimates provided, to show whether Butcher Ltd should proceed with the manufacture of the Azam.

(b) Prepare a statement showing the sensitivity of the net present value of manufacturing Azams to errors of estimation in each of the three factors: material cost per unit, annual sales volume, and product life.

Ignore taxation.

Solution

(a) NPV calculation

Cash flows resulting from manufacture and sale of Azams:

Time		Notes	Cash flows CU'000	Discount factor	Present value CU	
0	Machine	(a)	(250)	1	(250,000)	
1–5	Factory rent		(8)	4.329	(34,632)	
1–5	Manager's salary	(b)	(5)	4.329	(21,645)	
1–5	Materials cost	(c)	(45)	4.329	(194,805)	
1–5	Direct labour	(c)	(50)	4.329	(216,450)	432,900
1–5	Variable overheads	(c)	(25)	4.329	(108,225)	
1–5	Sales revenue		220	4.329	952,380	
	Annual cash flow		87			
Net present value					126,623	

On the basis of the estimates given, manufacture of the Azam is worthwhile.

(b) Sensitivity to forecast errors

A summary of the analysis is shown in the following table:

Item	Upper/lower limit for project acceptability	Maximum percentage error not affecting decision
Material cost per Azam (W1)	CU7.425	65%
Annual sales volume (W2)	7,075 units	29%
Product life (W3)	3.2 years (approx)	36%

The table shows that the manufacture of Azams would still be worthwhile if product life were to fall to about 3.2 years, or if annual sales were to fall to 7,075 units, or if material costs were to increase to CU7.43 per Azam. These figures represent percentage errors of 36%, 29% and 65% respectively on the original estimates. If the actual figures were within these percentages of the original estimates, the decision to go ahead would still have been valid. These are large percentages and the net present value is, therefore, remarkably insensitive to errors of estimation in the three factors.

WORKINGS

The approach taken is:

$$\text{Sensitivity} = \frac{\text{NPV of project}}{\text{PV of cash flows subject to uncertainty}}$$

(1) Material price

For the project to break even:

The NPV must fall by CU126,623

The PV of materials cost (CU194,805) must rise by CU126,623

This PV must rise by CU126,623 ÷ CU194,805 = 65%.

Annual materials cost, and therefore unit materials cost, must rise by 65%.

If this unit price rise were caused entirely by a rise in material price:

the increase per unit would be CU4.50 × 0.65 = CU2.925

and the break-even materials price would be CU7.425 (CU4.50 + CU2.925).

(2) Annual sales volume

The part of NPV that is affected by change in sales volume is:

(CU952,380 revenue – CU108,225 variable overheads – CU216,450 direct labour – CU194,805 materials) = CU432,900

(see cash flow table in NPV above)

If the project NPV is to fall by CU126,623 as a result of the sales volume falling, this PV of CU432,900 must fall by CU126,623. This is a fall in PV contribution of:

$$\text{Sensitivity} = \frac{\text{NPV of project}}{\text{PV of cashflows subject to uncertainty}}$$

$$\frac{\text{cu } 126{,}623}{\text{cu } 432{,}900} = 0.2925 \ (29\%)$$

The way in which the PV of annual contribution will fall by 29% is if contribution itself falls by 29%. This in turn is the result if sales volume falls by 29%.

An alternative approach to this calculation is to use contribution and the annuity factor:

Contribution per unit = CU10 (CU22 sales revenue – CU12 variable cost)

The fall in annual contribution which gives a drop in NPV to break-even point (ie a drop of CU126,623) is, using 4.329 the 5 year annuity factor:

Fall in annual contribution × 4.329 = CU126,623

$$\text{Fall in annual contribution} = \frac{\text{£'cu }126{,}623}{4.329} = \text{CU29,250}$$

ie if annual contribution falls by CU29,250 pa the NPV will be zero.

This is caused by a fall in annual demand of:

$$\frac{\text{cu } 29{,}250}{\text{cu } 10} = 2{,}925 \text{ units}$$

ie a fall of 29.25% of the planned volume of 10,000 units. The breakeven volume is therefore 7,075 units (10,000 – 2,925).

(3) Product life

The approach to sensitivity analysis to find the breakeven position is to set the NPV equal to zero.

ie NPV = (outlay) + PV of inflows

Zero = (250,000) + 87,000 × Annuity factor for product life at 5%

$$\therefore \text{ Annuity factor for product life at 5\%} = \frac{250{,}000}{87{,}000} = 2.874$$

It is necessary to know for how many years this is the 5% annuity factor:

From annuity tables

Annuity factor for three years @ 5% = 2.723

Annuity factor for four years @ 5% = 3.546

Therefore, project NPV is zero if life is greater than:

$$3 + \frac{2.874 - 2.723}{3.546 - 2.723} \text{ years (approximately)} = 3.2 \text{ years}$$

(Strictly speaking it should be said that the project will only change from being a success to a failure if its life falls from four to three years, as all cash flows are assumed to be at the year end.)

The project's planned life is 5 years. It can be shortened by 1.8 years (5 – 3.2 breakeven life) which is 36% of the planned life.

In a practical situation this process would be continued to determine the sensitivity of the project to all variables involved. This would include all costs, revenues and the discount rate (ie finding the IRR of the

project). Managers could then assess which variables were most crucial to the success of the investment, and decide whether there were any ways of reducing the uncertainty relating to them.

Interactive question 1: Sensitivity analysis [Difficulty level: Intermediate]

The following information applies to a new project:

Initial cost	CU125,000
Selling price	CU100/unit
Variable costs	CU30/unit
Fixed costs	CU100,000 pa
Sales volume	2,000 units pa
Life	5 years
Discount rate	10%

Requirement

Calculate the project's NPV and show how sensitive the result is to the various input factors.

See Answer at the end of this chapter.

Where annual flows are not annuities, the approach remains the same (ie at what point does the NPV become zero), although the calculations are rather more cumbersome.

Interactive question 2: Non-recurring cash flows [Difficulty level: Intermediate]

A company is about to embark on a two year project. Estimates of relevant inflows and outflows in current terms are as follows:

	Year 1	Year 2
	CU	CU
Sales	50,000	50,000
Costs	30,000	32,000

The following inflation rates are applicable to the flows:

Sales	6% pa
Costs	4% pa

Tax is payable at 21% on net flows.

The net cost of the project at t0, after allowing for capital allowance tax effects, is CU20,000.

The money cost of capital is 10% pa.

Requirements

(a) Calculate the NPV of the project.
(b) Assess the sensitivity of the investment decision to changes in sales revenue.

See Answer at the end of this chapter.

2.3 Strengths and weaknesses of sensitivity analysis

	Strengths
Sensitivity	Information will be presented to management in a form which facilitates subjective judgment to decide the likelihood of the various possible outcomes considered.
Critical issues	Identifies those areas which are critical to the success of the project; if it is undertaken those areas can be carefully monitored. • For example, if sales volume and/or price is identified as critical, further market research may help to improve confidence in the estimates • If the cost of materials or bought-in components is critical, then fixed price contracts may be a possible way of limiting the cost and uncertainty. Alternatively, it may be possible to use futures and options to limit materials costs • However, it should be noted that these attempts to reduce risk are not costless – market research costs money, option premiums must be paid, suppliers may demand up-front payments on fixed price contracts
Simple	No complicated theory to understand, it is relatively straightforward
	Weaknesses
Independence	It assumes that changes to variables can be made independently, eg material prices will change independently of other variables, which is unlikely. If material prices were to rise, the firm would probably increase selling price at the same time and there would be little effect on NPV.
Ignores probability	It only identifies how far a variable needs to change, it does not look at the probability of such a change. In the above analysis, sales volume appears to be the most crucial variable but, if the firm were facing volatile raw material markets, a 65% change in raw material prices would be far more likely than a 29% change in sales volume.
No clear answer	It is not an optimising technique. It provides information on the basis of which decisions can be made. It does not point directly to the correct decision.

One way in which some of these short-comings can be addressed is scenario building. If the essentials of the project being assessed are put on to a computer spreadsheet the analysis can be taken a lot further. A series of assumptions can be made about the variables and the effect of each combination of assumptions can be assessed, eg best and worst cases.

3 Simulation

Section overview

- Simulation allows for more than one variable at a time to change.
- Monte Carlo simulation uses random numbers to determine outcomes.
- Simulation has a number of drawbacks as a practical technique.

As noted above, one weakness of sensitivity analysis is that only one factor at a time is changed eg material price, product life etc. In the real world it is likely that more than one factor will change at the same time. Simulation is a technique which allows the effect of more than one variable changing at the same time to be assessed.

3.1 Monte Carlo simulation

This is a simulation technique based on the use of random numbers and probability statistics to investigate problems.

3.2 Who uses it?

Many companies use Monte Carlo simulation as an important tool for decision-making. For example

both General Motors and Procter and Gamble use simulation to estimate both the average return and the riskiness of new products.

Worked example: Monte Carlo simulation

Outcome	Probability
Head	0.5
Tail	0.5

A simulation of a coin being tossed might work as follows.

If a random number is selected:

Between: 0 – 4 (5 numbers) then a tail is assumed
Between: 5 – 9 (5 numbers) then a head is assumed

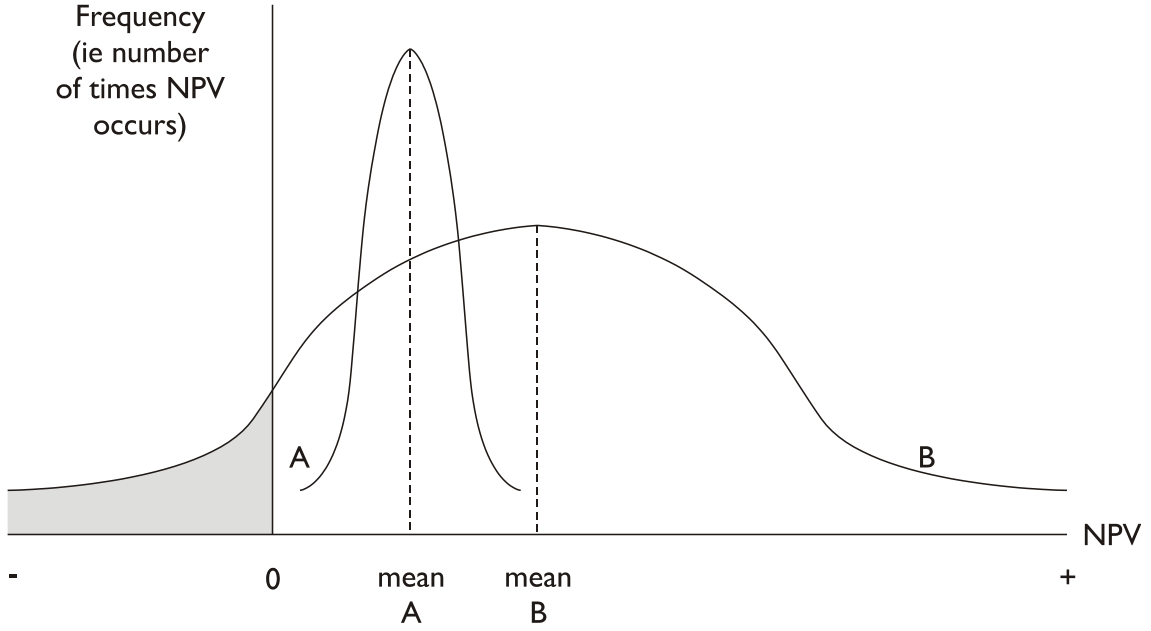
Random numbers	Simulated outcome
9	H
4	T
3	T
7	H
7	H
0	T
0	T
1	T
9	H
8	H

Thus in this Monte Carlo simulation of a coin being tossed 10 times, heads and tails appeared an equal number of times.

3.3 Results of a simulation exercise

Imagine that a firm is choosing between two projects and, using simulation, it has generated the distribution of the NPVs for each project.

The results might look like this:



Distribution of simulated NPVs for two projects

Project A has the lower average NPV but also is less risky (its outcomes are less widely dispersed about the mean).

Project B has the higher average NPV but also is more risky (higher dispersion of outcomes).

All simulation will do is to give the firm the above results. It will not tell the firm which is the better project. That depends on the investors' attitude to risk (see section 4 below). A may be preferred to B as there is no chance of it making a loss.

3.4 Advantages and limitations of simulation

Advantages

- It gives more information about the possible outcomes and their relative probabilities
- It is useful for problems which cannot be solved analytically

Limitations

- It is not a technique for making a decision, only for obtaining more information about the possible outcomes
- It can be very time-consuming without a computer
- It can prove expensive in designing and running the simulation on a computer for complex projects
- Monte Carlo techniques require assumptions to be made about probability distributions and the relationships between variables, that may turn out to be inaccurate

4 Expected values and attitude to risk

Section overview

- Expected values allow different outcomes to be built into the decision evaluation.
- Expected values ignore risk.
- Risk averse investors require an extra return to compensate for risk.

4.1 Expected values

The simplest way to work with a spread of possible outcomes is to use expected values or averages.

The expected value is an average (arithmetic mean) of possible outcomes, weighted by the probability of each outcome occurring.

Worked example: Expected values

A firm has to choose between two possible projects, the outcome of which depend on whether the economy is in recession or boom:

		Project A	Project B
	Probability	NPV	NPV
		CUm	CUm
Recession	0.6	– 100	– 50
Boom	0.4	+ 250	+ 200

Using expected values which project should be chosen?

Solution

Project A expected NPV = (0.6 × – CU100m) + (0.4 × CU250m) = CU40m

Project B expected NPV = (0.6 × – CU50m) + (0.4 × CU200m) = CU50m

Based on expected values, project B is the better project.

Interactive question 3: Expected payoff [Difficulty level: Easy]

State of market	Diminishing	Static	Expanding
Probability	0.4	0.3	0.3
Project 1	100	200	1,000
Project 2	0	500	600
Project 3	180	190	200

Payoffs represent the net present value of projects in CUm under each market state.

Requirement

Based on expected values which is the best project?

See Answer at the end of this chapter.

Interactive question 4: Uncertain sales [Difficulty level: Intermediate]

Harry is trying to evaluate a two year project using NPV. There is uncertainty as to the level of sales (in units) in each of the two years:

Year 1 Sales (units)	Probability	Year 2 Sales (units)	Probability
10,000	0.3	8,000	0.2
		10,000	0.8
		(if year 1 sales are 10,000)	
15,000	0.7	20,000	0.6
		10,000	0.4
		(if year 1 sales are 15,000)	

Requirement

On what expected level of sales in years 1 and 2 should Harry base his NPV calculation?

See Answer at the end of this chapter.

Interactive question 5: Uncertain contribution [Difficulty level: Intermediate]

Imagine in Interactive question 4 above that the project outlay is CU230,000 and each unit sold has a contribution of CU10.

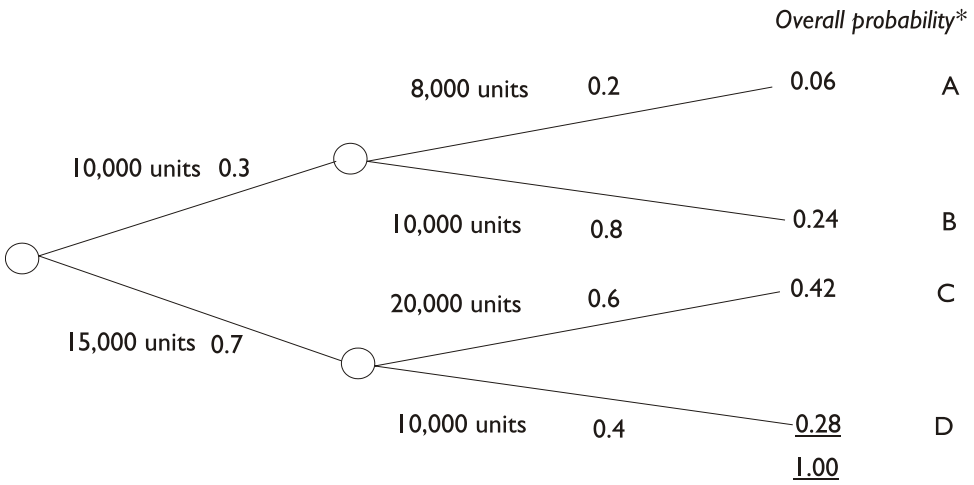
Requirement

If Harry's cost of capital is 10%, what is the project's expected NPV?

See Answer at the end of this chapter.

4.2 Analysing the outcomes

In Interactive questions 4 and 5 the information could have been laid out as follows:



* probability of year 1 sales × probability of year 2 sales, eg year 1 (10,000) and year 2 (8,000), overall probability is 0.3 × 0.2 = 0.06.

There are now four possible outcomes with NPVs as follows:

			Probability	CU
A	$\frac{10{,}000 \times 10}{1.1} + \frac{8{,}000 \times 10}{1.1^2}$	– CU230,000 = CU(72,975) ×	0.06	= (4,379)
B	$\frac{10{,}000 \times 10}{1.1} + \frac{10{,}000 \times 10}{1.1^2}$	– CU230,000 = CU(56,446) ×	0.24	= (13,547)
C	$\frac{15{,}000 \times 10}{1.1} + \frac{20{,}000 \times 10}{1.1^2}$	– CU230,000 = CU71,653 ×	0.42	= 30,094
D	$\frac{15{,}000 \times 10}{1.1} + \frac{10{,}000 \times 10}{1.1^2}$	– CU230,000 = CU(10,992) ×	0.28	= (3,078)
The expected NPV can be calculated as:				9,090

ie exactly as in Example 5 but there is now much more information.

Range of outcomes	It can be argued that as the expected NPV is positive, the project is worthwhile. However, the expected outcome of CU9,090 cannot occur if this project is undertaken only once, because a loss of CU72,975 or CU56,446 or CU10,992, or a gain of CU71,653 in NPV terms will result.
Probability of outcomes	In addition, the chance of a positive NPV is 0.42 (or 42%). The chance of a negative NPV must therefore be (1 – 0.42) = 0.58 or 58%. If the project is undertaken once only, it does not look particularly attractive despite the expected positive NPV.
Average return	However, if the project were repeated very many times, then on average it would make CU9,090 and this would be acceptable.

4.3 Advantages and limitations of expected values

Advantages

The advantages of expected values are that:

- The information is reduced to a single number for each choice
- The idea of an average is readily understood

Limitations

The limitations of expected values are that:

- The probabilities of the different possible outcomes may be difficult to estimate

  It is possible to use:

  – Objective probabilities based on past experience of similar projects; or

– Subjective probabilities, eg from the results of market research, where the project is very different

- The average may not correspond to any of the possible outcomes
- Unless the same decision has to be made many times, the average will not be achieved; it is therefore not a valid way of making a decision in 'one-off' situations unless the firm has a number of independent projects and there is a portfolio effect
- The average gives no indication of the spread of possible results, ie it ignores risk

4.4 Attitude to risk

The problems with applying expected values to a risky decision can be illustrated by a gambling example.

Worked example: Risk aversion

Suppose I am going to toss a coin 100 times.

Every time it shows heads you will pay me 30p, and every time it shows tails I will pay you 50p. Would you accept the gamble? You probably would accept. The expected value of the gamble is as follows:

		Payoff
Heads	0.5 × (30p)	(15)
Tails	0.5 × 50p	25
		10

All that is meant by the expected value is that if I toss the coin a large number of times, your average win per game is 10p. After 100 games you are likely to have won 100 × 10p = CU10 which is very acceptable, considering that your maximum loss on any game is 30p, and the chances of losing anything significant are very small.

The expected value computation is relevant because:

- The game is repeated many times; and
- The sums of money involved are small compared with your overall wealth.

Interactive question 6: Risk aversion [Difficulty level: Easy]

However, now suppose I offer you a different gamble. I am going to toss a coin just once.

If the result shows heads, you will pay me CU3,000. If tails, I will give you CU5,000.

Requirements

(a) Would you accept this gamble?
(b) What factors would determine your choice?

See Answer at the end of this chapter.

Definition

A risk averse investor is one who requires a higher average return in order to take on a higher level of risk.

This principle applies just as much to decisions made by directors of companies. A project which has a positive expected NPV, but which nevertheless carries a fair chance of forcing the company into liquidation if things go wrong, would probably be rejected.

Worked example: Attitude to risk

Mr Smith is a retailer currently earning profits of CU40,000 pa. He is considering two alternatives for expansion:

Alternative 1. Build a new counter in an unused area of the shop which will create an additional net contribution of CU8,000 pa with a high degree of certainty.

Alternative 2. Open a completely new franchise operation. If the franchise proves successful, it will generate an additional net contribution of CU40,000 pa. The problem, however, is that even if the franchise is unsuccessful Mr Smith will be committed to minimum royalty payments of CU20,000 pa indefinitely into the future. There is a 50% chance of success or failure.

Consider the intuitive reaction to such a decision. Most business people would prefer Alternative 1 because, although the possibility of very high contribution does not exist, there is no risk of any loss taking place.

5 Diversification and the portfolio effect

Section overview

- Risk can be reduced by diversification.
- Well diversified investors face systematic risk, which can be measured by a beta value.
- CAPM gives a return for systematic risk - it assumes investors are well diversified.
- The beta value can be adjusted to reflect gearing.

5.1 Introduction

In the above section, the analysis of risk and uncertainty has concentrated on altering future returns to allow for uncertainty of outcome (eg using probability distributions of returns).

An alternative approach is to allow for uncertainty by increasing the required rate of return on risky projects.

This latter approach is commonly taken by investors.

For example, when comparing a low risk building society investment with one in high risk equities, a higher return from equities would normally be required.

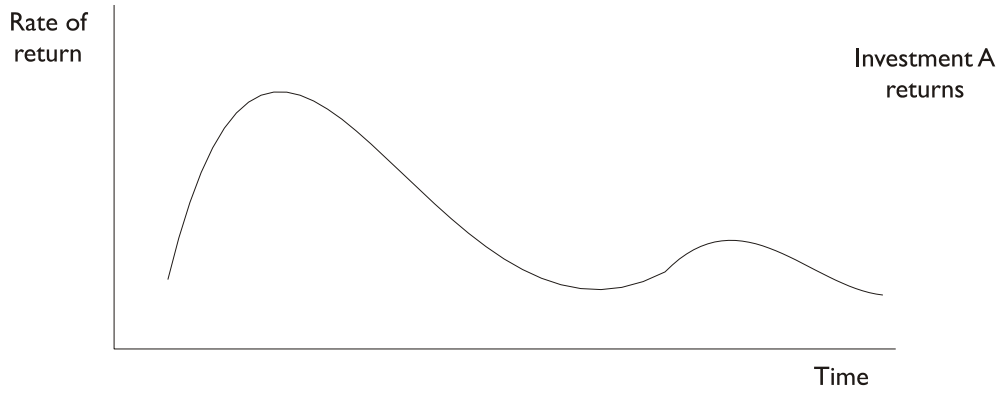
Similarly, when appraising equity investments in a well established property company against a similar investment in a recently listed computer manufacturer, a higher return would usually be demanded from the second investment to reflect its higher risk.

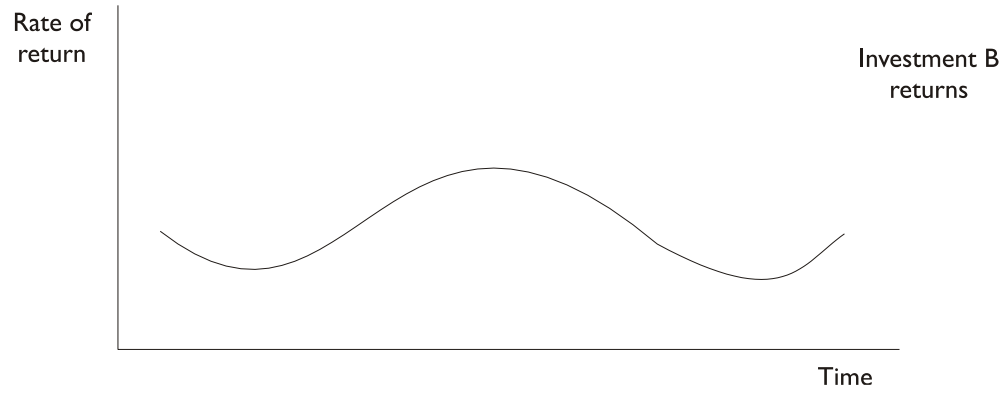
Investors seldom hold securities in isolation. They usually attempt to reduce their risks by 'not putting all their eggs into one basket' and therefore hold portfolios of securities. Before a risk-adjusted discount rate can be deduced from stock exchange returns, the risks taken by investors in their diversified investment portfolios need to be identified, as discussed below.

5.2 The portfolio effect

A portfolio is simply a combination of investments. If an investor puts half of his funds into an engineering company and half into a retail shops firm, it is possible that any misfortunes in the engineering company (eg a strike) may be to some extent offset by the performance of the retail investment. It would be unlikely that both would suffer a strike in the same period.

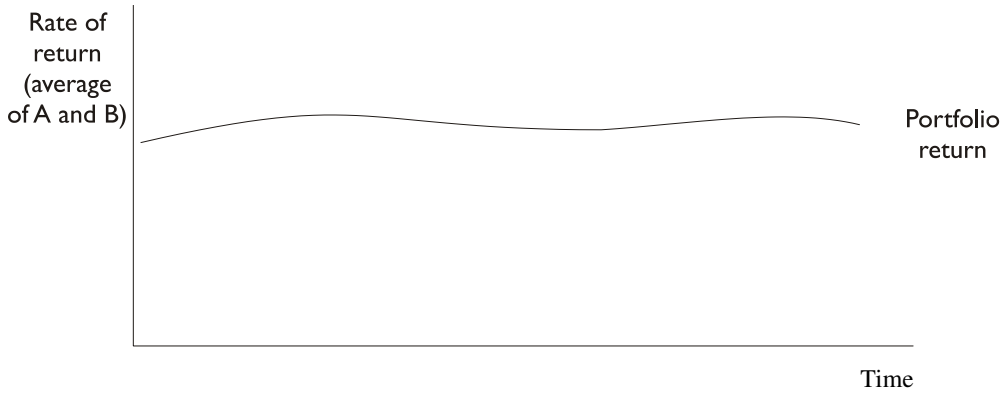
This effect can be demonstrated more formally in the following graphs. Assume two companies, A and B, whose fortunes are inversely correlated (ie when A does well B does badly and vice versa).





Individual returns

Both investment A and investment B show fluctuating returns over time. They both have about the same amount of variability. When A does well, B does badly, and vice versa. If both investments are held, the resulting portfolio will show the same average return but a greatly reduced risk, because the 'ups' of A cancel with the 'downs' of B and vice versa.



The portfolio effect

The same effect can be illustrated by a simple computational example.

Worked example: Risk reduction

Two traders sell their goods from a stall on the seafront at Brighton during the tourist season. One sells ice cream, the other umbrellas. Assuming there are two possible states of the weather – sun and rain, when the sun is out the ice cream seller makes a daily contribution of CU200, but when it rains she only makes CU20.

The returns made by the umbrella stall holder are the same, CU200 and CU20, but in rain and sun respectively.

State	Sun	Rain	Average	Risk
Probability	0.5	0.5		
Contribution – Ice creams	200	20	110	High
Contribution – Umbrellas	20	200	110	High

Although both businesses are profitable, the traders are a little unhappy about riding the rollercoaster of risk.

What would happen if the two traders pooled their resources and each offers the other product as well as their own?

Now both hold half their inventory as umbrellas and half as ice creams.

When it is sunny they would both make (1/2 × CU20) + (1/2 × CU200) = CU110, and,

When it rains they both make (1/2 × CU20) + (1/2 × CU200) = CU110.

State	Sun	Rain	Average	Risk
Probability	0.5	0.5		
Contribution	110	110	110	Zero

The average return is the same as before, but the risk is diversified away.

The above illustration is extreme in that risk has been completely eliminated. In practice the risk reduction is somewhat less when investments are combined.

Interactive question 7: Diversification [Difficulty level: Intermediate]

Morag Ltd can invest up to CU4m in either or both of the following projects:

Project	Outcome (NPV as % of investment)	Probability
X	(i) + 30%	0.5
	(ii) – 15%	0.5
Y	(i) + 30%	0.5
	(ii) – 15%	0.5

X and Y are independent of each other, ie project X's outcome in no way influences that of project Y and vice versa.

Requirements

Calculate the following:

(a) The best, worst and expected outcomes if the whole CU4m is invested in project X or project Y.

(b) The best, worst and expected outcomes, together with associated probabilities, if half of the CU4m is invested in X and the other half in Y.

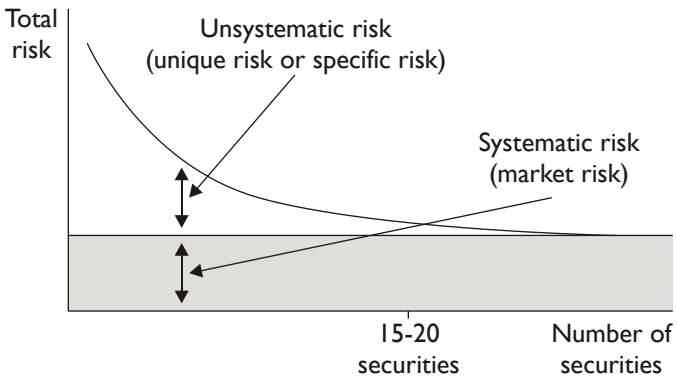
See Answer at the end of this chapter.

5.3 Systematic and non-systematic risk

As seen above, portfolios enable risk to be reduced. Evidence shows that the total risk of a security can be split into the proportion that may be diversified away, and the proportion that will remain after diversification. This remaining risk is the relevant risk for appraising investments.

Evidence shows that increasing the number of securities in a portfolio reduces the risk.

Starting by constructing a portfolio with one share and gradually adding other shares to it, the total risk of the portfolio reduces. The portfolios are constructed randomly.



Portfolio size and risk reduction

Initially, substantial reductions in total risk are possible. However, as the portfolio becomes more and more diversified, risk reduction slows down and eventually stops, ie each additional share yields successively less risk reduction.

Definition

Unsystematic, unique or specific risk: The risk that can be eliminated by diversification.

Unsystematic risk is related to factors that affect the returns of individual investments in unique ways (eg the risk that a particular firm's labour force might go on strike or its equipment might fail).

Definition

Systematic or market risk: The risk that cannot be eliminated by diversification.

To some extent the fortunes of all companies are dependent on the economy. Changes in macroeconomic variables such as interest rates, exchange rates, taxation, inflation, etc affect all companies to a greater or lesser extent and cannot be avoided by diversification, ie they apply systematically right across the market.

5.4 Systematic risk and return

5.4.1 Systematic risk

The relevant risk of an individual security is its systematic risk and it is on this basis that investments should be judged. Unsystematic risk can be eliminated and is of no consequence to the well-diversified investor. Note that it is not necessary to hold the whole market portfolio to diversify away unsystematic risk – a portfolio of 15-20 randomly selected securities will eliminate the vast majority of it.

It is not the case that individual shares carry the same amount of systematic risk. Some shares are more susceptible to economic factors than others. For example, food retailing is less susceptible to economic factors than the construction industry.

As unsystematic risk can be diversified away, investors need only concern themselves with (and will only earn returns for taking) systematic risk.

5.4.2 Measuring systematic risk

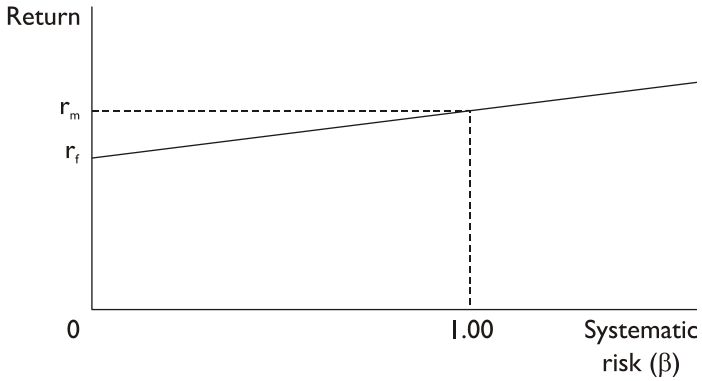
The next problem is how to measure the systematic risk of investments and the required returns. The model adopted is the capital asset pricing model (CAPM).

The method adopted by CAPM is to measure systematic risk as an index, normally referred to as beta (β). As with any index some base points need to be established and then other observations will be calibrated around these points. The two base points are as follows:

(a) The risk-free security – this carries no risk and therefore no systematic risk. The risk-free security hence has a beta of zero.

(b) The market portfolio – this is a portfolio of all risky investments. This represents the ultimate in diversification and therefore contains only systematic risk. CAPM sets beta to 1.00 for the market portfolio and this will represent the average systematic risk for the market.

These two points may be represented on the following graph:



Graphical representation of CAPM

The upward sloping line gives the relationship between systematic risk and return. From the graph it can be seen that the higher the systematic risk, the higher the required rate of return.

Do not be surprised that some securities carry a systematic risk greater than 1.0. This merely means that these investments are more affected by changes in macroeconomic variables than the average market investment.

For example, shares in construction companies are strongly influenced by economic factors and therefore have betas greater than 1.0.

5.5 CAPM equation

5.5.1 Calculations

The line of the above graph is often referred to in the form of an equation:

$$rj = rf + \beta j\ (rm - rf)$$

where
- rj = required rate of return on investment j
- rf = risk-free rate of interest
- rm = return on the market portfolio
- βj = index of systematic risk for security j

Note that when applied to shares, rj is the same as the cost of equity capital ke (see the chapter on cost of capital).

This formula is provided in the examination. Very basic calculations are required and you are expected to be able to explain how the equation works.

5.5.2 Explanation

There is a basic risk-free return (rf) which reflects the rational nature of investors ie they require a return to reflect the time value of money. On top of this investors require a premium for systematic risk. The average market premium for such risk is (rm – rf) which the β flexes, ie if the investment has more systematic risk than the market average, β is > 1.00 and the premium (β(rm – rf)) is therefore greater than the market average.

5.5.3 Estimating the variables

The problem with estimating rf is finding a risk free asset and estimating its future returns. Government short-dated (eg Treasury) bills are probably the closest thing available in the real world and the return they provide can be predicted with reasonable accuracy by economic forecasters.

Estimating rm is perhaps even more difficult. History shows a very volatile performance for the stock market over time. It is probably best to use the long-term average premium (ie rm – rf) which is around 5% pa in real terms.

5.6 Aggressive and defensive shares

The expected returns on the market portfolio will change in relation to altered economic expectations. This in turn will bring about a change in the expected return of shares, which depends on their beta factor.

Beta is a measure of the responsiveness of the expected share return to changes in the return of the market. Shares with high betas are termed aggressive, and those with betas less than one are termed defensive.

As far as stock market investment tactics are concerned, an investor should buy high beta shares if the market is expected to rise (a 'bull' market) because they can be expected to rise faster than the market. If the market is expected to fall (a 'bear' market) low beta shares are more attractive.

The only problem with this strategy is the need to forecast general market movements in advance, otherwise the investor might end up holding an aggressive share in a falling (bear) market.

Interactive question 8: Different sectors **[Difficulty level: Intermediate]**

You are considering investing in the sectors listed below. For each, estimate the expected beta value and thus the likely performance of the stock.

Question	Answer
Supermarkets	
Pharmaceuticals	
Construction	
Airlines	
Car manufacturing	

See Answer at the end of this chapter.

5.7 Application of the CAPM to project appraisal

5.7.1 Developed for shares

The capital asset pricing model was originally developed to explain how the returns earned on shares are dependent on their risk characteristics. However, its greatest potential use in the financial management of a company is in the setting of minimum required returns (ie risk-adjusted discount rates) for new capital investment projects.

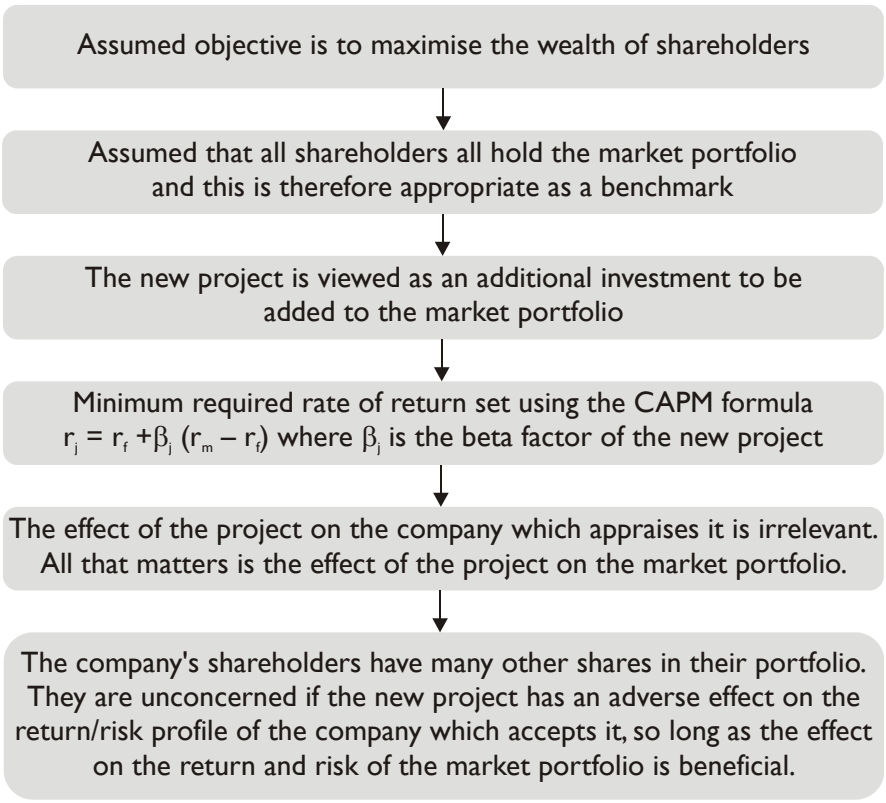
5.7.2 Risk-adjusted discount rate

The great advantage of using the CAPM for project appraisal is that it clearly shows that the discount rate should be related to the project's risk. It is not good enough to assume that the firm's present cost of capital can be used if the new project has different risk characteristics from the firm's existing operations. After all, the cost of capital is merely a return which investors require on their money, and this will go up if risk increases.

In addition, in making a distinction between systematic and unsystematic risk, it shows how a highly speculative project such as mineral prospecting may have a lower than average required return because its risk is highly specific and associated with the luck of making a strike, rather than with the ups and downs of the market (ie it has a high total risk but a low systematic risk).

5.7.3 Logic behind use of CAPM

It is important to follow the logic behind the use of the CAPM in this way:



It is important to note that there are two major weaknesses with the assumptions:

Diversification	The company's shareholders may not be diversified. Particularly in smaller companies they may have invested most of their assets in this one company. In this case the CAPM approach will be inappropriate.
Stakeholders	Even in the case of larger companies the shareholders are not the only participants in the firm. It is difficult to persuade directors and employees that the effect of a project on the fortunes of their company is irrelevant. After all, they cannot diversify their job and are exposed to both the systematic and specific risks of the business, ie total risk. Thus managers may try to diversify, even though shareholders are better placed to do so, in order to protect their jobs. This is another example of agency costs.
Perfect capital market	In addition to these weaknesses there is the problem that the CAPM depends on a perfect capital market; for the purposes of the examination, however, this may be ignored. There is also the obvious practical difficulty of estimating the beta of a new investment project.

5.8 Valuation models beyond the CAPM

5.8.1 Problems with applying the CAPM in practice

(a) The need to determine the excess return (rm – rf). Expected, rather than historical, returns should be used, although historical returns are often used in practice.

(b) The need to determine the risk-free rate. A risk-free investment might be a government security. However, interest rates vary with the term of the lending.

(c) Errors in the statistical analysis used to calculate β values. Betas may also change over time.

(d) The CAPM is also unable to forecast accurately returns for companies with low price/earnings ratios and to take account of seasonal 'month-of-the-year' effects and 'day-of-the-week' effects that appear to influence returns on shares.

5.8.2 Alpha values

The alpha value can be seen as a measure of how wrong the CAPM is.

Alpha values:

(a) Reflect only temporary, abnormal returns, if CAPM is a realistic model

(b) Can be positive or negative

(c) Over time, will tend towards zero for any individual share, and for a well-diversified portfolio taken as a whole will be zero

(d) May exist due to the inaccuracies and limitations of the CAPM

If the alpha value is positive, investors who don't hold shares will be tempted to buy them (to take advantage of the abnormal return), and investors who do hold shares will want to hold on to them so share prices will rise. If the alpha value is negative, investors won't want to buy them, and current holders will want to sell them, so share prices will fall.

For example, ABC Ltd's shares have a beta value of 1.2 and an alpha value of +2%. The market return is 10% and the risk-free rate of return is 6%.

The required return is 6% + (10% – 6%) × 1.2 = 10.8%

The current return = expected return ± alpha value = 10.8% + 2% = 12.8%

5.8.3 Alternatives to the CAPM

The CAPM specifies that the only risk factor that should be taken into account is the market risk premium. Subsequent empirical research has shown that there may be other factors in addition to market risk premium that explain differences in asset returns, such as interest rates and industrial production.

Unlike the CAPM, which analyses the returns on a share as a function of a single factor – the return on the market portfolio, the arbitrage pricing model (APM) assumes that the return on each security is based on a number of independent factors. The actual return r on any security is shown as:

$r = E(rj) + \beta 1F1 + \beta 2F2 \ldots + e$

where E(rj) is the expected return on the security

$\beta 1$ is the sensitivity to changes in factor 1

F1 is the difference between actual and expected values of factor 1

$\beta 2$ is the sensitivity to changes in factor 2

F2 is the difference between actual and expected values of factor 2

e is a random term

Factor analysis is used to ascertain the factors to which security returns are sensitive. Four key factors identified by researchers have been:

- Unanticipated inflation
- Changes in the expected level of industrial production
- Changes in the risk premium on bonds (debentures)
- Unanticipated changes in the term structure of interest rates

The Arbitrage Pricing Theory (APT) works in a similar way to the CAPM in that it assumes that investors are fully diversified, so only systematic risks influence the returns. However unlike CAPM, the possible systematic factors are numerous and vary in each particular case. The general APT model for the return of a security has been formulated as follows.

$E(rj) = rf + (E(rA) - rf)\beta A + (E(rB) - rf)\beta B + \ldots\ldots\ldots + (E(rM) - rf)\beta M + \ldots\ldots$

Where $(E(rA) - rf)\beta A$ is the risk premium on factor A

$(E(rB) - rf)\beta B$ is the risk premium on factor B and so on

Arbitrage pricing theory does not specify what the systematic risk factors are, or whether the various betas will be positive or negative. Research suggests that the risk factors tend to be from changes in the macroeconomic environment such as inflation, interest rates and production and consumption levels. Some companies will be more sensitive to changes in these factors and these will be measured by the relevant beta factor.

Fama and French identified two factors in addition to the market portfolio that explain company returns namely size and ratio of book value to market value.

The size factor is measured as the difference in return between a portfolio of the smallest stocks and a portfolio of the largest stocks. The average small stock is thought to be riskier than the average large stock and therefore there is an additional risk premium here.

The value factor is proxied by the difference in return between a portfolio of the highest book to market value stocks and portfolio of the lowest book to market value stocks. A share with a high balance sheet (book) value per share when compared to the market share price (a so-called value stock) is observed as having a higher return generally than a share with a low ratio of book value to market value.

The Fama and French three factor model is as follows

$E(rj) = rf + \beta i,m\ (E(rm) - rf) + \beta i,S\ SIZE + \beta i,V\ VALUE$

where $\beta i,m$ is the stock's beta

$\beta i,S$ is beta with respect to size

$\beta i,V$ is the stock's beta with respect to value

Unlike the CAPM, these factors are to be determined empirically.

The Fama and French model has been augmented with the addition of a fourth factor, which is momentum. The momentum factor is based on the concept that a share that has been increasing in price will continue to perform well and a share that has been dropping in value will continue to perform badly. It is measured by the difference in return between a portfolio of shares that have increased in value and a portfolio of shares that have fallen in value.

5.8.4 Bond-yield-plus premium approach

The bond-yield-plus model is based on the empirical observation that the return on equity is higher than the yield on bonds. Since equities are riskier than bonds, the difference between the two is a reward the investor requires in order to invest in the riskier asset. Now if this equity market premium was constant, then the required rate of return for equity could simply be calculated by looking at the bond yields and then adding the fixed premium.

5.8.5 Fundamental beta

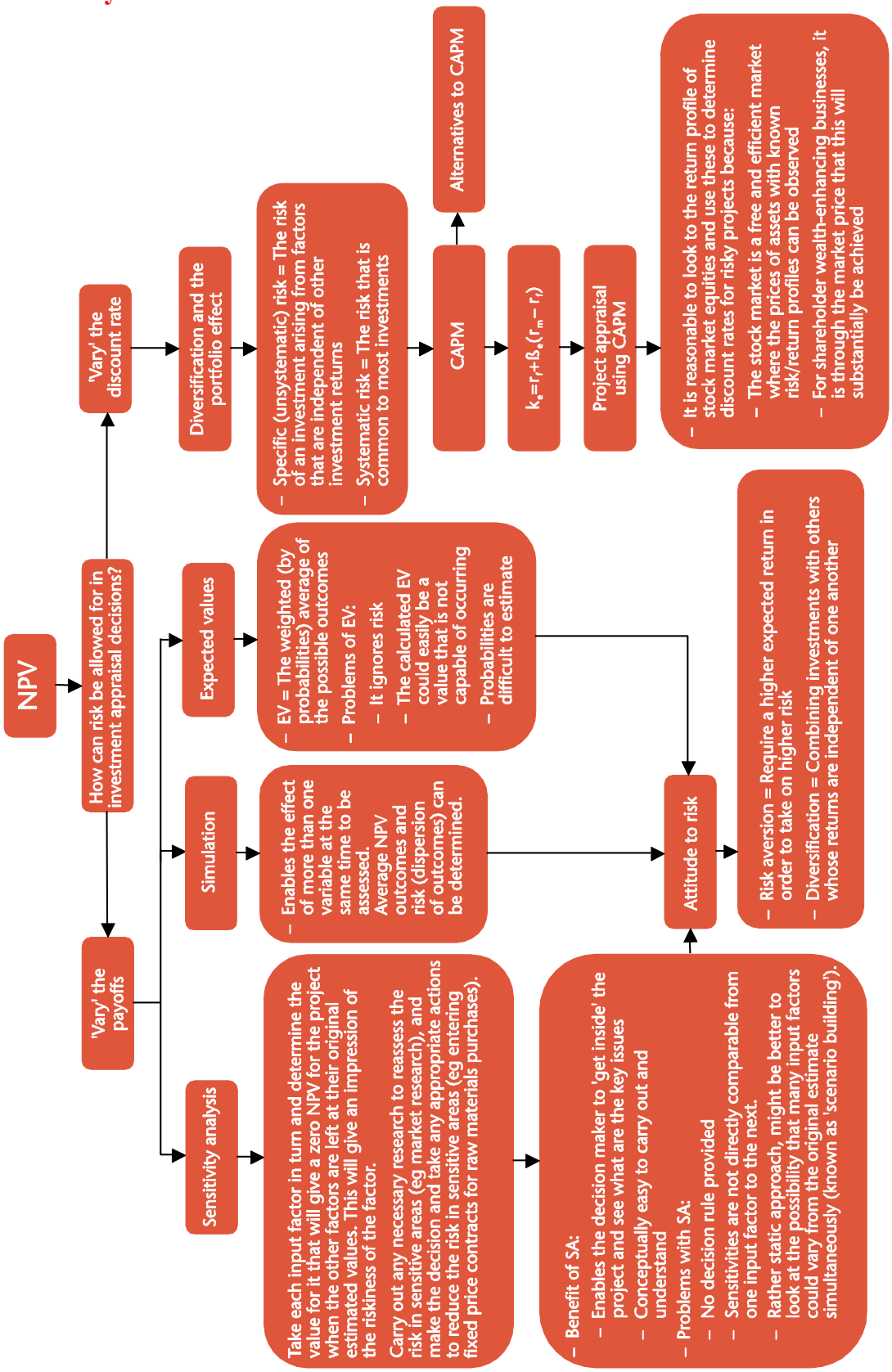
A CAPM calculated beta is based on historical data. Many analysts and business managers have moved to calculating a fundamental beta. This is a beta which is based on the basic notion of the risk-return relationship ie where a company's cash flows are subject to greater risk, then the required return should be higher.

Greater risk is caused by three different factors:

- The nature of the business operations
- The level of operating gearing
- The level of financial gearing

The major disadvantage to this approach is that the adjustment up or down is subjective and lacks precision, but it allows a commonsense valuation based on the risk that the valuer sees in the future cash flows.

Summary


NPV
How can risk be allowed for in investment appraisal decisions?
'Vary' the discount rate
Diversification and the portfolio effect
– Specific (unsystematic) risk = The risk of an investment arising from factors that are independent of other investment returns
– Systematic risk = The risk that is common to most investments
CAPM
Alternatives to CAPM
$k_e = r_f + ß_e(r_m - r_f)$
Project appraisal using CAPM
– It is reasonable to look to the return profile of stock market equities and use these to determine discount rates for risky projects because:
– The stock market is a free and efficient market where the prices of assets with known risk/return profiles can be observed
– For shareholder wealth-enhancing businesses, it is through the market price that this will substantially be achieved
'Vary' the payoffs
Expected values
– EV = The weighted (by probabilities) average of the possible outcomes
– Problems of EV:
– It ignores risk
– The calculated EV could easily be a value that is not capable of occurring
– Probabilities are difficult to estimate
Simulation
– Enables the effect of more than one variable at the same time to be assessed.
Average NPV outcomes and risk (dispersion of outcomes) can be determined.
Sensitivity analysis
Take each input factor in turn and determine the value for it that will give a zero NPV for the project when the other factors are left at their original estimated values. This will give an impression of the riskiness of the factor.
Carry out any necessary research to reassess the risk in sensitive areas (eg market research), and make the decision and take any appropriate actions to reduce the risk in sensitive areas (eg entering fixed price contracts for raw materials purchases).
– Benefit of SA:
– Enables the decision maker to 'get inside' the project and see what are the key issues
– Conceptually easy to carry out and understand
– Problems with SA:
– No decision rule provided
– Sensitivities are not directly comparable from one input factor to the next.
– Rather static approach, might be better to look at the possibility that many input factors could vary from the original estimate simultaneously (known as 'scenario building).
Attitude to risk
– Risk aversion = Require a higher expected return in order to take on higher risk
– Diversification = Combining investments with others whose returns are independent of one another

Self-test

Answer the following questions.

1 Adrian is contemplating purchasing for CU60,000 a machine which he will use to produce 10,000 disks per annum for five years. These disks will be sold for CU9 each and unit variable costs are expected to be CU5. Incremental fixed costs will be CU14,000 per annum for production costs and CU5,000 per annum for selling and administration costs. Adrian has a required return of 10% per annum.

By how many units must the estimate of production and sales volume fall for the project to be regarded as not worthwhile?

2 A company has constructed a model for predicting profits. Net profit or loss depends on two variables: gross profit and overheads. The following are independent probability distributions of the two variables.

Gross profit	Probability	Overheads	Probability
CU		CU	
12,000	0.1	6,000	0.3
6,000	0.4	4,000	0.3
4,000	0.4	3,000	0.3
3,000	0.1	2,000	0.1

What is the probability that the company will make a positive net profit?

3 The annual sales volume and the unit contribution margin of a new product are uncertain. Estimates for these two variables are as follows:

Sales volume	Unit	Contribution	Probability
(units)	probability		
80,000	0.1	CU2.00	0.5
75,000	0.6	CU1.50	0.5
50,000	0.3		

The sales volume (which has an expected value of 68,000) and unit contribution margin (which has an expected value of CU1.75) have been assumed to be independent.

If the annual fixed costs are CU130,000, what is the probability that the company will make a loss?

4 A new customer has asked company X to undertake a contract. The following details are available:

	CU
Contract price	10,000
Variable costs	(7,500)
Contribution	2,500

It is estimated that there is a 0.2 probability that no money will be forthcoming from the customer after completion of the contract, but a 0.8 probability that the contract price will be paid in full.

Alternatively, a credit report could be purchased for CU600 which would indicate for certain whether the customer will pay the contract price.

What is the expected contribution from the contract if the company pursues the optimal strategy?

5 Chancie Ltd has made the following estimates of sales for a new product with an expected life of two years:

	High sales	Average sales	Low sales
Probability	0.4	0.3	0.3
	CU	CU	CU
Year 1	15,000	10,000	8,000
Year 2	20,000	10,000	4,000

Variable costs are uncertain and the following estimates are made for the two year period:

Variable costs as a percentage of sales	Probability
80%	0.1
70%	0.2
60%	0.4
50%	0.3

Fixed overheads will be increased by CU4,000 per annum if the product is manufactured. Chancie Ltd has a cost of capital of 15% per annum.

What is the expected net present value (to the nearest CU100) of making and selling the product over the next two years?

6 Foods Ltd has made a public announcement that it intends to introduce a new product which will decrease the beta of the firm. On the same day, Drinks Ltd has publicly announced that it is being sued by a major customer for a batch of faulty goods.

If neither of these items of information had been made public before, what effect should they have on the companies' share prices, assuming the Stock Market is semi strong efficient?

7 The following data relates to the ordinary shares of Burton Ltd.

Average market return	20%
Risk-free rate of return	13%
Beta factor of Burton Ltd's equity	1.5

What is Burton's cost of equity, using the capital asset pricing model?

8 STRATHBURN LTD

Strathburn Ltd is a family-owned medium-sized company specialising in the distribution of office stationery. It is currently reviewing its investment plans for the future and has under consideration three projects to be funded out of CU2 million of investments which have been specially set aside.

The projects and their respective cash flows and probabilities are as follows.

Project	Initial cost	PV of net earnings	Probability
	CUm	CUm	
LMT	2.0	7.0	0.417
		1.0	0.583
GTV	1.0	3.5	0.5
		0.5	0.5
CUJ	1.0	3.0	0.5
		0	0.5

Requirements

(a) Compare the outcomes of investing all the funds in project LMT with that of sharing them between projects GTV and CUJ (round to nearest CU5,000). **(4 marks)**

(b) (i) On the basis of the expected values calculated, in which project(s) would you invest?
(ii) What are the weaknesses inherent in this approach to decision-making?
(iii) What other factors should be considered in making this decision? **(8 marks)**

(12 marks)

9 SENATOR TERRY TRUFO

Senator Terry Trufo's firm, TT Bonus Inc, has undertaken some legal and academic research at a cost of CU4,000 into the possibilities of selling university degrees. The firm is unsure of the outcome of such a venture but feels that there is a 60% chance of annual income of CU70,000 and a 40% chance of annual income of CU40,000.

Printing machinery would need to be bought at a cost of some CU40,000 payable in two equal annual instalments, one immediately and one in one year's time if the equipment had been operating correctly for a year. The equipment would be depreciated on a straight line basis by CU3,500 per annum for ten years and then sold. Use would also be made of some existing equipment which originally cost CU6,000, has a book value of CU1,000, and would cost CU9,000 to replace, though the firm is considering selling it for CU2,000.

Production and labour costs in the first year would amount to CU55,000 payable in one year's time, though the next nine years' costs would fall to CU30,000 if demand were low in the first year. Revenue would first be receivable in two years' time and for the following nine years. Fixed costs of CU5,000 per annum would be reallocated to the degree project.

Requirements

Calculate the following.

(a) Accounting rate of return by expressing

(i) Average annual pre-tax accounting profit on the project as a percentage of the book value of the initial investment

(ii) The same profit as a percentage of the average book value of the investment

(iii) Total accounting profit as a percentage of the initial investment. **(2 marks)**

(b) Payback period. **(2 marks)**

(c) Internal rate of return of the project. **(2 marks)**

(d) Net present value of the project at the company's required rate of return of 8%.

(2 marks)

(e) The sensitivity of your result in (d) to the estimates of

(i) The required rate of return

(ii) Sales revenue

(iii) Life of the project **(6 marks)**

(14 marks)

Note: Requirements (a) – (c) are revision of basic techniques

10 COMFIFEET LTD

Comfifeet Ltd, a footwear manufacturer, has a factory in Hampshire that it rents on a lease due to expire at the end of December 20X4. The factory is entirely devoted to making Old Faithful carpet slippers (OFs). The market for the slippers has been declining and a decision had been taken two years ago not to seek to renew the lease in 20X4, but to close down OF manufacture when the lease expires. At a recent meeting of the company's board of directors the question was raised as to whether it might be more beneficial to close at the end of December 20X1, three years earlier than had originally been decided. As a member of the company's finance staff, you have been asked to look into this question.

Sales of OFs are projected to be as follows for the next three years.

Year	CU'000
20X2	10,000
20X3	7,500
20X4	5,000

The marketing director believes that these figures could be increased if an advertising campaign were to be undertaken. Such a campaign would involve cash outlays of CU1 million on 31 December in each of 20X1, 20X2 and 20X3. The marketing director acknowledges that the results of the advertising campaign are uncertain, but she believes that there would be at least a 10% increase in sales on the projected figures and the increase could be as high as 25%. To ease assessment it has been agreed that it is reasonable to assume that the increase will be either 10% with a probability of 40%, or 25% with a probability of 60%. If the advertising were to be undertaken, the expenditure would be available for tax relief in the accounting year in which it would be incurred.

The variable costs of manufacture of OFs are estimated at 30% of the selling price. The rent of the factory is CU5 million a year, payable on 1 January. The owner of the factory will not agree to an early termination of the lease, but the company has the right to sublet the factory. The directors are confident of finding a subtenant who would pay CU4 million on 1 January in each of the three relevant years.

The plant used in the factory was all bought in January 20W8 for CU2,000,000. Were the factory to close in 20X1, it would be sold in December for CU1,000,000, but if it were retained until 20X4 it would be sold in December of that year for an estimated CU200,000. For the purposes of the present analysis, treat the plant as if it had been excluded from the general pool. This means that it attracts 18% (reducing balance) tax allowances in the year of its acquisition and in every subsequent year of its being owned by the company except the last year. In the last year, the difference between the plant's written down value for tax purposes and its disposal proceeds will either be allowed to the company as an additional tax relief if the disposal proceeds are less than the written down value, or be charged to the company if the disposal proceeds are more than the tax written down value.

Apart from rent and depreciation, fixed costs are estimated to be CU1,000,000 each year, including a CU300,000 allocation of head office costs.

When the factory closes certain staff would be entitled to redundancy payments. These would total CU400,000 if closure were to take place in 20X1, but rise to CU450,000 if closure were in 20X4. In either case the payment would be made on the day of closure and be fully allowable for corporation tax for the year concerned.

Production of OFs gives rise to a working capital requirement of an amount equal to 5% of the sales value. This needs to be in place by the beginning of each year concerned. By the end of the production period all of the working capital will have been released. Closure on either date is not expected to have any effect on any of the company's other activities. It is estimated that the appropriate cost of capital is 10% per annum.

The company's accounting year is to 31 December and the corporation tax rate of 21% is payable at the end of the year to which it relates.

Requirements

(a) Determine, on the basis of net present value (NPV), whether the advertising should be undertaken, assuming that closure is delayed until 20X4. **(6 marks)**

(b) Taking account of your conclusion from (a) determine, on the basis of NPV, whether the company should close the factory in 20X1 or in 20X4. **(12 marks)**

(18 marks)

11 GFL

George, Skinner and Fleet Ltd ('GFL') is a large construction company and has a financial year end of 31 December. It has been invited to bid, via a tender contract, for a major piece of ground preparation work for a London development site. You have been asked by GFL's senior management to advise them.

You have the following information and estimates to aid your decision:

(1) The work would take two years to complete and would start in January 20X7.

(2) The successful bidder for the contract would receive an advance payment of CU2 million in January 20X7 and the balance is receivable in early January 20X9.

(3) Materials to be used on the work would cost CU820,000 (20X7) and CU930,000 (20X8).

(4) The company would need to transfer 20 of its highly skilled employees from other GFL construction sites in London for the last eighteen months of the contract (ie from July 20X7). The current average annual wage of these employees is CU23,000, but they will each be paid a premium of 15% above this figure for working on the development site. They will be replaced at their existing sites by new workers, who because of their comparative lack of experience will receive an average annual wage of CU19,000.

(5) To supplement the transfers in (4) above, GFL would employ 45 new workers at a total cost of CU830,000 per annum on the development site for the whole two years (20X7 and 20X8).

(6) GFL will also need to hire additional site management staff for the duration of the contract at an average annual total cost of CU420,000.

(7) To aid the ground preparation work, GFL will make use of one of its biggest earth removing machines. This cost CU3.2 million when purchased in 20X4, but it is currently under-utilised because of the changing characteristics of GFL's work. As a result, GFL was planning to sell it by the end of 20X6 and has received a firm offer of CU1.1 million from Tideford Construction Limited. GFL's management consider that the machine, if it is employed on the development site, will be worth, at most, CU200,000 by the end of the contract.

The earth moving machine attracts capital allowances, but is excluded from the general pool. This means that it attracts 18% (reducing balance) tax allowances in the year of expenditure and in every subsequent year of being owned by the company, except the last year. In the last year, the difference between the machinery's written down value for tax purposes and its disposal proceeds will be either

(i) Allowed to the company as an additional tax relief, if the disposal proceeds are less than the tax written down value, or

(ii) Be charged to the company, if the disposal proceeds are more than the tax written down value.

- The materials and labour costs outlined in (3) to (6) above are all stated at December 20X6 price levels. It is expected that these costs will inflate at the estimated annual general rate of inflation, which is 2% for 20X7 and 3% in subsequent years.
- Unless otherwise stated, you can assume that all cash flows take place at the end of the year in question.
- The corporation tax rate is 21% per annum and is payable in the same year as the investment/income/costs to which it relates.

GFL's management is aware that this will be a very competitive bidding process. At the company's most recent board meeting, it was agreed that a total tender price of CU7 million for the contract would be reasonable, but that, if there was a danger of being outbid, a lower price would be considered as long as the 'figures added up'. GFL has of late used a post-tax money cost of capital of 9% to appraise its investments.

One of GFL's directors has made the point that were the company to be successful with this bid, there is a possibility that it might be asked to tender again for further contracts, which are likely to be held in either Africa or South America. GFL has not to date undertaken any contracts abroad.

Requirements

(a) Advise, with supporting calculations, GFL's senior management as to whether tendering for the contract at a total price of CU7 million would enhance shareholder value.

(15 marks)

(b) Calculate the minimum total contract price that GFL should set that would be neutral in terms of shareholder value. **(5 marks)**

(c) Advise GFL's senior management as to the key areas of risk (excluding the management of foreign exchange risk) that could arise if GFL was to undertake investments abroad. (5 marks)

(25 marks)

Now go back to the Learning Objectives in the Introduction. If you are satisfied you have achieved these objectives, please tick them off.

Answers to Interactive questions

Answer to Interactive question 1

NPV = – 125,000 + [(100 – 30) 2,000 – 100,000] × 3.791

= CU26,640

Sensitivity to

(1) Selling price

125,000 = [(P – 30) 2,000 – 100,000] × 3.791

32,973 = 2,000P – 60,000 – 100,000

P = 96.49

ie fall of 3.51% before NPV is zero.

Alternatively

$$\frac{\text{CU } 26{,}640}{2{,}000 \times £100 \times 3.791}$$

(2) Variable costs

125,000 = [(100 – V) 2,000 – 100,000] × 3.791

32,973 = 200,000 – 2,000V – 100,000

V = 33.51

ie increase of 11.7% before NPV is zero.

Alternatively

$$\frac{\text{CU } 26{,}640}{2{,}000 \times \text{CU } 30 \times 3.791}$$

(3) Volume

125,000 = [(100 – 30) q – 100,000] × 3.791

32,973 = 70q – 100,000

q = 1,900

ie fall of 5% before NPV is zero.

Alternatively

$$\frac{\text{CU } 26{,}640}{2{,}000 \times (\text{CU } 100 - 30) \times 3.791}$$

(4) Initial cost

CU(125,000 + 26,640) = CU151,640

ie increase of 21% before NPV is zero.

Alternatively

$$\frac{\text{CU } 26{,}640}{\text{CU } 125{,}000}$$

(5) Fixed costs

125,000 = [(100 – 30) 2,000 – F] × 3.791

32,973 = 140,000 – F

F = 107,027

ie an increase of 7% before NPV is zero.

Alternatively

$$\frac{\text{CU } 26{,}640}{\text{CU } 100{,}000 \times 3.791}$$

(6) Life

125,000 = 40,000 × AFn @ 10%

3.125 = AFn @ 10%

AF for 4 years at 10% is 3.17

ie life can fall to approximately 4 years before NPV is zero.

(7) Discount rate

3.125 = AF for 5 years @ x %

From tables AF for 5 years @ 15% is 3.352, so x is more than 15%

Try 20%

NPV = (125,000) + 40,000 × 2.991 = (5,360)

$$\text{IRR} = 10\% + \frac{26,640}{26,640 + 5,360}(20\% - 10\%) = 18\%$$

ie an increase of 80% before NPV is zero.

Answer to Interactive question 2

(a) NPV

	t0	t1	t2
	CU	CU	CU
Sales – current values inflated @ 6%		53,000	56,180
Costs – current values inflated @ 4%		(31,200)	(34,611)
		21,800	21,569
Tax @ 21%		(4,578)	(4,529)
Investment	(20,000)		
	(20,000)	17,222	17,040
DF @ 10%	1	0.909	0.826
PV	(20,000)	15,655	14,075

NPV = CU9,730

(b) Sensitivity

Let R = revenue at t1 and t2 in current terms.

		CU	Time	DF	PV
Investment		(20,000)	t0	1	(20,000)
After tax revenue	0.79 ×	1.06R	t1	0.909	0.761R
After tax revenue	0.79 ×	1.062R	t2	0.826	0.733R
After tax costs	0.79 ×	(31,200)	t1	0.909	(22,405)
After tax costs	0.79 ×	(34,611)	t2	0.826	(22,585)
					1.494R – 64,990

If 1.494R – 64,990 = 0, then R = CU43,501

This is CU6,499 less than the CU50,000 estimated. CU6,499 is 13.0% of CU50,000, so revenue can fall by 13.0% before the NPV becomes zero.

Alternatively

PV of revenue

	t1	t2
	CU	CU
Revenue	53,000	56,180
Tax effect	(11,130)	(11,798)
	41,870	44,382
DF @ 10%	0.909	0.826
PV	38,060	36,660

$$\text{Sensitivity} = \frac{\text{NPV}}{\text{PV of CFs affected}} \times 100\% = \frac{\text{CU } 6,730}{\text{CU } 44,720} \times 100\% = 13.0\%$$

Answer to Interactive question 3

Project 1 Expected value = (CU100 × 0.4) + (CU200 × 0.3) + (CU1,000 × 0.3) = CU400m

Project 2 Expected value = (0 × 0.4) + (CU500 × 0.3) + (CU600 × 0.3) = CU330m

Project 3 Expected value = (CU180 × 0.4) + (CU190 × 0.3) + (CU200 × 0.3) = CU189m

Therefore, based on expected values, Project 1 should be adopted

Answer to Interactive question 4

Year 1 Expected sales = (10,000 × 0.3) + (15,000 × 0.7)
= 13,500

Year 2 Expected sales = (0.3 (8,000 × 0.2 + 10,000 × 0.8)) + (0.7 (20,000 × 0.6 + 10,000 × 0.4))
= 14,080

Answer to Interactive question 5

$$NPV = -CU230{,}000 + \frac{13{,}500 \times £10}{1.1} + \frac{14{,}080 \times £10}{1.1^2} = CU9{,}090$$

Alternatively (using discount tables):

NPV = – CU230,000 + (13,500 × CU10 × 0.909) + (14,080 × CU10 × 0.826) = CU9,016

(difference due to rounding).

Answer to Interactive question 6

The odds are the same as in the previous game but the sums of money involved are much larger and the game will not be repeated. If you lose, you do not have a chance of winning back your money.

Whether or not you accept this gamble depends on much more than the expected value of CU1,000. You would somehow be weighing up the following factors in your mind:

(a) The chances of winning CU5,000

(b) How much you would enjoy winning CU5,000 (the level of satisfaction is often referred to as 'utility')

(c) The chances of losing CU3,000

(d) How much you would dislike losing CU3,000

(e) How much you like or dislike taking risks

(f) How much you trust me!

For most people the unacceptability of incurring a loss of CU3,000 would prevent them playing, even though the game has a positive expected value. They are risk-averse.

Answer to Interactive question 7

(a) All CU4m in X

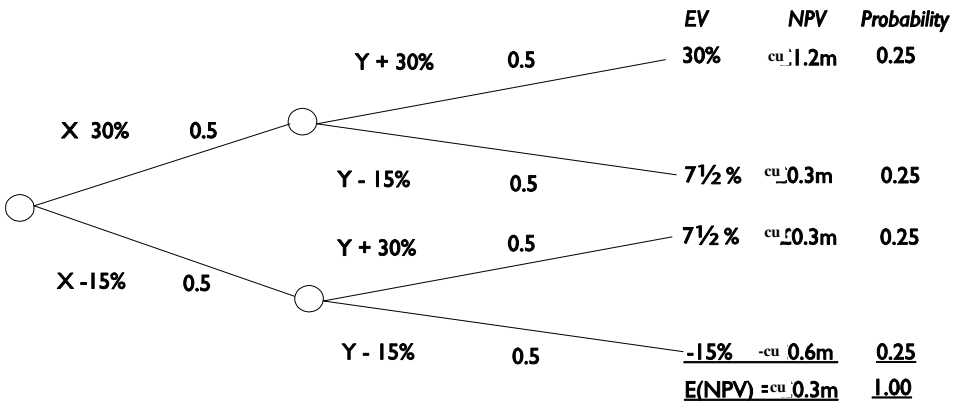
Expected outcome = (0.5 × 30%) + (0.5 × –15%) = 7½%

So 7½% × CU4m = CU300,000 NPV

(Best outcome 30% × CU4m = CU1.2m; worst outcome – 15% × CU4m = – CU0.6m)

All CU4m in Y – as X above.

(b)



Now there is less chance of the extremes occurring (CU1.2m had a 50% chance before, similarly – CU0.6m). Chance of either extreme is now 0.25 and a 0.5 chance of CU0.3m (no chance of this before). Therefore, risk is reduced.

Answer to Interactive question 8

Sector	Likely beta	Performance
Supermarkets Pharmaceuticals	$\beta < 1$	Food retailers and drug companies tend to be recession proof due to selling necessities. Their fortunes however do not lift significantly when economic prosperity arrives.
Construction Airlines Car manufacturing	$\beta > 1$	Industries involved in capital goods, or which make and sell non-essential goods and services eg air travel, will show a high degree of systematic risk.

Answers to Self-test

1

	Cash flow CU'000	10% factor	PV CU
Time 0 machine	(60)	1	(60,000)
Time 1-5 contribution	40	3.791	151,640
Time 1-5 fixed costs	(19)	3.791	(72,029)
Positive NPV			19,611

PV of contribution must fall by CU19,611

Sales volume must fall by $\frac{\text{CU}19,611}{\text{CU}151,640} = 12.93\%$

Fall in sales volume = 0.1293 × 10,000
= 1,293

2

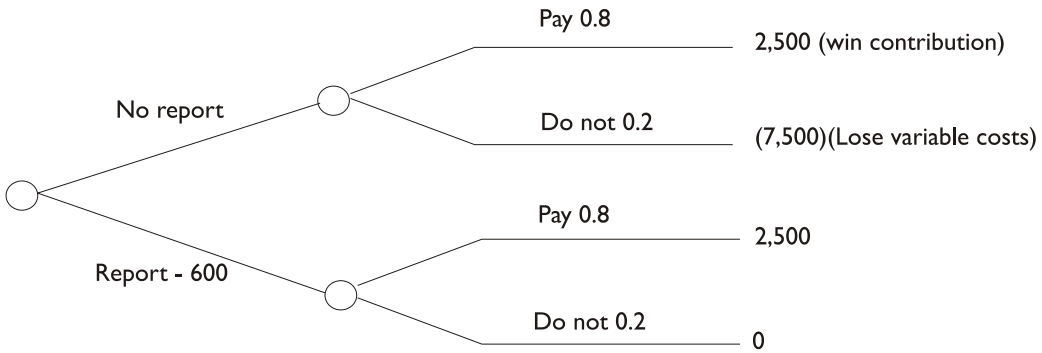
Gross profit CU'000	Overheads CU'000	Probability
12	Any	0.1
6	4, 3 or 2	0.4 × 0.7
4	3 or 2	0.4 × 0.4
3	2	0.1 × 0.1
	Total =	0.55

3

Sales volume	Margin CU	Profit/(loss)	CU'000
80,000	2.00	(80 × 2.00) – 130 =	30.0
80,000	1.50	(80 × 1.50) – 130 =	(10.0)
75,000	2.00	(75 × 2.00) – 130 =	20.0
75,000	1.50	(75 × 1.50) – 130 =	(17.5)
50,000	2.00	(50 × 2.00) – 130 =	(30.0)
50,000	1.50	(50 × 1.50) – 130 =	(55.0)

Probability of a loss = (0.1 × 0.5) + (0.6 × 0.5) + 0.3
= 0.65

4 Although decision trees are not examinable, they often help to answer the 'simpler' EV questions.



EV no report = (0.8 × 2,500) – (0.2 × 7,500)
= CU500

EV report = (0.8 × 2,500) – 600
= CU1,400

5 Expected variable cost as percentage of sales = 61%
Year 1 expected sales = CU11,400
Expected contribution CU11,400 × 0.39 = CU4,446
Expected profit CU(4,446 – 4,000) = CU446
PV of profit CU446 ÷ 1.15 = CU388
Year 2 expected sales = CU12,200
Expected contribution CU12,200 × 0.39 = CU4,758
Expected profit CU(4,758 – 4,000) = CU758
PV of profit CU758 ÷ 1.15^2 = CU573
Total expected NPV CU(388 + 573) = CU961

≈ CU1,000 rounded

6 β decreases ⇒ ke decreases ⇒ MV increases since MV = $\frac{D}{k_e}$

Drinks being sued is likely to cause a fall in MV.

7 The correct answer is: 23.5%

ke = rf + β (rm – rf)

= 13% + 1.5 (20 – 13)%

= 23.5%

8 STRATHBURN LTD

(a) Outcomes

Project	Initial cost	PV of earnings	NPV	Probability (NPV)	EV
	CUm	CUm	CUm		CUm
LMT	2.0	7.0	5.0	0.417	2.085
	2.0	1.0	(1.0)	0.583	(0.583)
					1.502
				or (rounding)	1.5
GTV	1.0	3.5	2.5	0.5	1.25
	1.0	0.5	(0.5)	0.5	(0.25)
CUJ	1.0	3.0	2.0	0.5	1.0
	1.0	0	(1.0)	0.5	(0.5)

Possible outcomes of projects

Option 1 Project LMT

Expected value = CU1.5m
Possible values = CU5.0m or – CU1.0m

Option 2 Projects GTV and CUJ

Expected values	GTV NPV	CUJ NPV	Combined NPV	Probability	EV
	CUm	CUm	CUm		CUm
	2.5	2.0	4.5	0.5 × 0.5	1.125
	2.5	(1.0)	1.5	0.5 × 0.5	0.375
	(0.5)	2.0	1.5	0.5 × 0.5	0.375
	(0.5)	(1.0)	(1.5)	0.5 × 0.5	(0.375)
					1.5

(b) Evaluation

(i) If there were no restriction on funds and assuming that shareholder wealth maximisation is the prime objective, then it would be in the interest of Strathburn Ltd to adopt all three projects, since they have positive NPVs.

Given that the available capital funds are limited to CU2m, it is not possible to invest in all projects and so a choice needs to be made. The fact that the same expected NPV (CU1.5m) is achieved under options 1 and 2 means that either option can be selected.

(ii) The limitations of applying expected value analysis are clearly highlighted by Strathburn Ltd's dilemma.

- Expected value analysis is only appropriate where an activity or process will recur frequently. It is particularly inappropriate where a company's management are considering a one-off decision such as this.
- Expected values take no account of the risks involved in an investment, ie the range or variability of possible outcomes. For example, in Strathburn Ltd's case the first option has a maximum value of CU5m and a low of – CU1m. Option 2 results in outcomes which are less widely dispersed with a high of CU2.5m and a low of – CU1m.
- Expected values ignore the investors' attitude to risk. This can be measured by the use of indifference curves.
- Expected values will frequently not produce a value which corresponds with a possible outcome. This is the case for option 1, although in the case of option 2 the expected value of CU1.5m can in fact occur.

The fact that Strathburn Ltd is having to use probabilities in association with NPVs raises problems, in that the probabilities are estimates and could be difficult to calculate. A particular example is illustrated in the probabilities associated with project LMT.

(iii) Other factors that merit consideration are as follows.

- How well diversified are the shareholders of Strathburn Ltd?

  Well diversified under portfolio theory/CAPM requires investors to hold 15-20 well chosen shares. This will allow shareholders to diversify away any unsystematic risk.

  Since Strathburn Ltd is a family-owned business, the owners are less likely to be fully diversified and so they should select option 2 which spreads their investment across two projects, rather than investment returns totally dependent on project LMT.
- Assuming shareholders are risk-averse, the fact that option 2 has only a 25% chance of making a negative NPV while option 1 has a 58% chance would lend support to the selection of projects GTV and CUJ.
- If the shareholders are well diversified, then the criteria for selecting a project or not should be guided by the 'systematic risk' (market risk) carried by the investment, ie the extent to which the investment earnings are sensitive to changes in the macro economy.
- The choice of discount rate for the projects will need to take full account of the business and finance risks associated with each.

9 SENATOR TERRY TRUFO

Calculations of cash flows

Average annual revenue	= 0.6 × CU70,000 + 0.4 × CU40,000 = CU58,000
Post-first year annual costs	= 0.6 × CU55,000 + 0.4 × CU30,000 = CU45,000
First year's costs	= CU55,000

(a) Accounting rate of return

	CU
Initial investment	
Legal costs	4,000
Machinery	40,000
Existing equipment	1,000
	45,000
Final book value	
Machinery	5,000
Total depreciation (45,000 – 5,000)	40,000
Total production and labour costs (average) (9 × 45,000 + 55,000)	460,000
Total reallocated fixed costs	50,000
	550,000
Total revenue (average)	580,000
Total profit	30,000
Average annual profit	3,000

(i) ARR = $\frac{3{,}000}{45{,}000} \times 100 = 62/3\%$

(ii) ARR = $\frac{3{,}000}{\frac{1}{2}(45{,}000 + 5{,}000)} \times 100 = 12\%$

(iii) ARR = $\frac{30{,}000}{45{,}000} \times 100 = 662/3\%$

(b) Payback

Payback is a measure based on relevant cash flows, which are as follows.

Time	Cash flow	Narrative
	CU	
0	(20,000)	First instalment on printing machinery
0	(2,000)	Opportunity cost of existing plant
1	(20,000)	Second instalment on printing machinery
1	(55,000)	First year's labour and production cost
2 – 10	13,000	Net cash inflows from project
10	5,000	Scrap proceeds of plant
11	58,000	Final year's revenue

Notes

(1) The legal and academic research has already been done, and the cost of it is not saved if the project does not proceed. It is a sunk cost.

(2) Fixed costs reallocated to the project are not cash flows.

The cash outflows at times 0 and 1 (total CU97,000) are recouped at a rate of CU13,000 per year and hence are repaid in 7.46 years

Since cash inflows start at time 2, payback is in 8.46 years or nine years if receipts are assumed to arise at year-ends.

(c) Internal rate of return

NPV @ 8% = CU10,939 (see part (d) below)

Since this is positive the second 'guess' is higher, reducing the effect of the later positive cash flows.

Hence, NPV @ 12% = CU(8,878) (again, see part (d))

The IRR must therefore be between 8% and 12%.

By interpolation,

$$\text{IRR} = a + \frac{NPV_1}{NPV_1 - NPV_2}(b - a)$$

$$= 8 + \frac{10,939}{10,939 - (-8,878)} \times (12 - 8)$$

$$= 8 + 2.2$$

$$= 10.2\%, \text{ say } 10\%.$$

(d) Net present value

Time	Cash flows	Discount factor @8%	Present value @8%	Discount factor @12%	Present value @12%
	CU'000		CU'000		CU'000
0	(22)	1	(22.000)	1	(22.000)
1	(75)	0.926	(69.450)	0.893	(66.975)
2 – 10	13	5.784 (W1)	75.192	4.757(W1)	61.841
10	5	0.463	2.315	0.322	1.610
11	58	0.429 (W2)	24.882	0.287 (W2)	16.646
			10.939		(8.878)

WORKINGS

(1) AF(2 – 10) = AF(1 – 10) – DF(1)
At 8% AF(2 – 10) = 6.71 – 0.926 = 5.784
At 12% AF(2 – 10) = 5.65 – 0.893 = 4.757

(2) $DF(11) = \frac{1}{(1+r)^{11}}$

At 8% $DF(11) = \frac{1}{1.08^{11}} = 0.429$

At 12% $DF(11) = \frac{1}{1.12^{11}} = 0.287$

(e) Sensitivity

(i) Required rate of return

As shown in part (c) the project has an IRR of 10%; therefore the required rate of return can rise from 8% to 10% before the investment decision would change. This represents a rise of 2 percentage points or

$$\frac{2}{8} \times 100 = 25\%$$

(ii) Sales revenue

Present value of sales revenue is

AF(2 – 11 @ 8%) × CU58,000 = (5.784 + 0.429) × CU58,000
= CU360,354

The percentage change in sales revenue required to change the decision is given by

$$\frac{10,939}{360,354} \times 100\% = 3.04\%$$

(iii) Life of project

If project were shortened by one year the NPV would fall by

DF(11 @ 8%) × 58,000 – DF(10 @ 8%) × 45,000

= 0.429 × 58,000 – 0.463 × 45,000

= CU4,047

Shorten the project by a further year and the NPV falls by

DF(10 @ 8%) × 58,000 – DF(9 @ 8%) × 45,000

= 0.463 × 58,000 – 0.500 × 45,000

= CU4,354

The NPV of the project is thus reduced to 10,939 – 4,047 – 4,354 = CU2,538

PV of cash flows of the eighth year are

DF(9 @ 8%) × 58,000 – DF(8 @ 8%) × 45,000

= 0.50 × 58,000 – 0.54 × 45,000

= CU4,700

This is sufficient to change the positive NPV (CU2,538) into a negative and hence alter the initial decision to go ahead.

Sensitivity = $\frac{3 \text{ years}}{10 \text{ years}}$ or 30%

Note: The effect of receiving the sale proceeds of plant earlier is small and has been ignored.

10 COMFIFEET LTD

(a) Determination of the benefit of advertising

Assessment of the advertising decision

	20X1 CUm	20X2 CUm	20X3 CUm	20X4 CUm
Additional contributions (W1)		1.330	0.998	0.665
Tax thereon		(0.279)	(0.210)	(0.140)
Working capital (W2)	(0.095)	0.024	0.024	0.047
Advertising	(1.000)	(1.000)	(1.000)	
Tax thereon	0.210	0.210	0.210	
	(0.885)	0.285	0.022	0.572
Discount factor	1.000	0.909	0.826	0.751
Discounted	(0.885)	0.259	0.018	0.430

NPV = CU(0.178)m

Therefore, do not advertise.

WORKINGS

(1) Additional contributions

		CUm
20X2	CU10m ((0.25 × 0.60) + (0.10 × 0.40)) × 0.70	1.330
20X3	CU7.5m ((0.25 × 0.60) + (0.10 × 0.40)) × 0.70	0.998
20X4	CU5m ((0.25 × 0.60) + (0.10 × 0.40)) × 0.70	0.665

(2) Working capital on additional sales

20X1	1.900 × 0.05	(0.095)
20X2	(1.900 – 1.425) × 0.05	0.024
20X3	(1.425 – 0.950) × 0.05	0.024
20X4	0.950 × 0.05	0.047

(b) Determination of the factory closure date

Assessment of the closure decision

	20X1 CUm	20X2 CUm	20X3 CUm	20X4 CUm
Contributions (sales × 0.70)		7.000	5.250	3.500
Tax thereon		(1.470)	(1.103)	(0.735)
Rent	(4.000)	(4.000)	(4.000)	
Tax thereon		0.840	0.840	0.840
Plant	(1.000)			0.200
Capital allowances (W3)	0.042	0.034	0.028	0.086

	(0.022)			
Fixed costs		(0.700)	(0.700)	(0.700)
Tax thereon		0.147	0.147	0.147
Redundancy payments	0.400			(0.450)
Tax thereon	(0.084)			0.095
Working capital (W4)	(0.500)	0.125	0.125	0.250
	(5.164)	1.976	0.587	3.233
Discount factor	1.000	0.909	0.826	0.751
Discounted	(5.164)	1.796	0.485	2.428

NPV = CU(0.455)m

Therefore close the factory in 20X1.

WORKINGS

(3) Capital allowances

		CUm		CUm
20W8	Cost	2.000		
	WDA	0.360		
		1.640		
20W9	WDA	0.295		
		1.345		
20X0	WDA	(0.242)		
		1.103		
either				
20X1	Disposal	1.000		
	Balancing allowance	0.103	@ 21%	0.022
or				
20X1	WDA	0.199	@ 21%	0.042
		0.904		
20X2	WDA	0.163	@ 21%	0.034
		0.741		
20X3	WDA	0.133	@ 21%	0.028
		0.608		
20X4	Disposal	0.200		
Balancing allowance		0.408	@ 21%	0.086

(4) Working capital on basic sales

		CUm
20X1	10.000 × 0.05	(0.500)
20X2	(10.000 – 7.500) × 0.05	0.125
20X3	(7.500 – 5.000) × 0.05	0.125
20X4	5.000 × 0.05	0.250

11 GFL

(a)

	20X6 Y0 CU'000	20X7 Y1 CU'000	20X8 Y2 CU'000	20X9 Y3 CU'000
Machine sale forgone	(1,100.000)			
Tax on machine sale forgone (W1)	(220.853)			
Revised machine sale			200.000	
Revised machine tax savings (W2)	81.333	66.693	261.826	
Contract price	2,000.000		5,000.000	
Tax on contract		(420.000)		(1,050)

Materials (W3)		(836.400)	(977.058)	
Labour (W3)		(1,503.990)	(1,784.969)	
Tax saved on Mats/Lab		491.482	580.026	
Total cash flow	760.480	(2,202.215)	3,279.825	(1,050)
Factor	1.000	0.917	0.842	0.772
PV	760.480	(2,019.431)	2,761.613	(810.600)
NPV	692.062			

Thus the NPV is positive with a total project price of CU7 million and should be accepted.

(b) Break even project price:

y = reduction in income in year 2.

$0.842y - 0.21y \times 0.772 = CU692,062$

$0.67988y = CU692,062$

$y = CU1,017,918$

Thus breakeven income in year 2 = CU5,000,000 – CU1,017,918 = CU3,982,082

Total project price = CU5, 982,082

(c) Possible risks with overseas investment (excluding forex) are:

- Financing, eg borrow locally to offset political risk?
- Political risk, eg mild political interference or more severe?
- Business risk, eg level of systematic business risk abroad and discount rate?
- Tax, eg corporation tax rate, capital allowances, tax treaties?
- Remitting funds back to Bangladesh, eg dividends, royalties, management charges?
- Culture, eg different business practices?

WORKINGS

(1) Machine – sell

	CU'000
Cost	3,200.000
WDA X4	576.000
WDV X4	2,624.000
WDA X5	472.320
WDV X5	2,151.680
Bal Adj X6	1,051.680
sale X6	1,100.000
Tax on Bal all @ 21%	220.853

(2) Machine – carry on

	20X6	20X7	20X8
WDV b/f	2,151.680	1,764.378	1,446.790
WDA	387.302	317.588	1,246.790
WDV/sale	1,764.378	1,446.790	200.000
Tax on WDA	81.333	66.693	261.826

(3)

		1.02	1.03
Materials	Real	–820.000	–930.000
	Money	–836.400	–977.058
Labour t/f Y1 – 6 months (premium)	Real	–34.500	
Labour t/f Y2 (premium)	Real		–69.000
Labour new Y1– 6 months	Real	–190.000	
Labour new Y2	Real		–380.000
Supplementary workers	Real	–830.000	–830.000

Extra management	Real	–420.000	–420.000
Total wages	Real	–1,474.500	–1,699.000
	Money	–1,503.990	–1,784.969

CHAPTER 4

Sources of finance

Introduction

Examination context

Topic List

1 Capital markets, risk and return
2 Sources of equity finance
3 Sources of debt finance
4 International money markets
5 Ethics
6 Capital market efficiency
7 Behavioural finance

Summary and Self-test

Answers to Interactive questions

Answers to Self-test

Introduction

Learning objectives

Tick off

- Assess the suitability of different financing options for a given business ☐
- Explain the characteristics of different types of finance ☐
- Explain the role of different types of finance ☐

The syllabus references that relate to this chapter are 1b, c, h, k

Syllabus links

The implications of a financing decision will be seen in Financial Reporting, Taxation and Auditing. It will be explored further at advanced level and in the final case study, as it is one of the most important decisions a business will take.

Examination context

Exam questions will not only require the candidate to be aware of practical sources of finance but also to be able to assess their suitability to given situations.

1 Capital markets, risk and return

Section overview

- Capital markets provide a source of funds for companies and an exit route for investors.
- Risk and return go hand in hand, and companies need to bear in mind the risk-return trade-off of investors.
- The main sources of finance raised by issuing securities are
  - Equity, or ordinary share capital
  - Preference shares
  - Loan stocks or debentures.

1.1 Capital market

The market for funds is wide and crosses national boundaries. It is false to talk about a single capital market. There are many ways in which firms can access funds, including:

National stock markets	in Bangladesh this includes the Dhaka Stock Exchange ('the Stock Exchange') and the Chittagong Stock Exchange which not only act as markets for 'second-hand' securities such as shares, but also act as a primary source of new funds, eg via new share issues.
The banking system	this can be split between the retail market and the wholesale market, which service individuals/small businesses and large companies respectively.
Bond (debt) markets	generally the province of very large organisations raising typically large amounts of money.
Leasing	this is a very important source of capital finance for a whole variety of companies.
Debt factoring	normally used by smaller organisations to help finance their working capital requirements.
Government and European Union grants	this type of assistance promotes development of industry in underdeveloped areas or in overseas markets.
International markets	typically available to larger companies, these markets allow funds to be raised in different currencies, typically in very large amounts.

1.2 Risk and return

The type of finance used by a commercial organisation – whatever market (see above) is utilised – ultimately takes the form of debt capital or equity capital (also known as ordinary share capital). Whilst there are many forms of these two types of capital, the key characteristic that distinguishes them is that they have different levels of risk.

Debt holders face lower risk than shareholders. They receive interest before shareholders receive any dividends, and in the event of company failure, the debt holders will rank higher than the equity holders. This means that any capital amounts due to the debt holders will be repaid before the shareholders receive anything.

The debt holders have a price to pay for this lower risk however; they will receive a lower rate of return on their capital.

The shareholders' position is more risky – they will suffer the downside of any loss. Correspondingly, they will expect a higher rate of return. Thus any profits will go to the shareholders, not the debt holders.

There are of course different varieties of capital within this framework – for example, preference shares will usually have a risk somewhere between debt and ordinary shares.

In summary, risk and return go hand in hand. Therefore in structuring its capital finances, a company must have regard to the risk-return trade-off desired by potential investors.

1.3 Issued capital

The following sections explore the key characteristics of equity, preference shares and debt capital, and examine the factors which need to be considered when businesses and investors come to choose between them. These forms of capital invariably involve issuing securities (ie shares or bonds).

Definitions

Equity represents the **ordinary shares** in the business. Equity shareholders are the owners of the business and through their voting rights exercise ultimate control.

Preference shares form part of the risk-bearing ownership of the business but, since they are entitled to their dividends before ordinary shareholders, they carry less risk. As their return is usually a fixed maximum dividend, they are similar in many ways to debt.

Loan stocks and **debentures** are typically fixed interest rate borrowings with a set repayment date. Most are secured on specific assets or assets in general such that lenders are protected (in repayment terms) above unsecured creditors in a liquidation.

A table summarising and contrasting the main features of these general forms of finance follows.

Factor / Type of capital	Ordinary shares (equity)	Preference shares (normally cumulative)	Debt	
			Secured debentures and loan stock	Unsecured debentures and loan stock
Security of investor in terms of repayment of capital	Rank after creditors/payables and preference shares in liquidation.	Rank after all creditors/payables but usually before ordinary shareholders in a liquidation.	Secured on one or more specific assets, usually land and buildings, which are mortgaged, or over assets generally. On default the assets are sold; a surplus over the debenture/ loan adds to the assets of the company available for creditors - the other assets of the company are liable for deficit.	None; holders have the same rights as ordinary creditors/ payables.
Voting rights of investor	Usually have voting rights in general meetings of the company.	Right to vote at a general meeting only when dividend is in arrears or when it is proposed to change the legal rights of the shares.	No voting rights.	No voting rights.

Factor / *Type of capital*	*Ordinary shares (equity)*	*Preference shares (normally cumulative)*	*Debt*	
			Secured debentures and loan stock	*Unsecured debentures and loan stock*
Income payment obligation of company	Dividends payable at the discretion of the directors (subject to sanction by shareholders) out of undistributed profits remaining after senior claims, eg interest and preference dividends, have been met.	A fixed maximum amount per year at the discretion of the directors (subject to sanction of shareholders) and in accordance with rules regarding dividends; appears accumulate and must be paid before a dividend on ordinary shares.	A fixed annual amount of interest, usually expressed as a percentage of nominal value (often referred to as the coupon rate).	
Obligation to return capital and amount	No obligation unless/until liquidated. The right to all surplus funds after prior claims have been met.	A fixed amount per share where expressly redeemable, otherwise similar to ordinary shares.	A fixed amount per unit of loan stock or debenture, usually on a fixed date. Can be avoided by company buying loan stock or debentures in the open market and cancelling.	
Corporation tax	Dividends no tax deductible	Dividends not tax deductible	Interest is tax deductible, reducing effective cost for company.	
Issue costs (ie the administrative and legal costs associated with raising the finance).	Up to 15% of finance raised depending on method used. Covered in more detail in a later section.	As equity.	Relatively cheap compared to equity.	

Factor / *Type of capital*	*Ordinary shares (equity)*	*Preference shares (normally cumulative)*	*Debt*	
			Secured debentures and loan stock	*Unsecured debentures and loan stock*
Degree of control exercised by existing shareholders	Retained earnings and rights issues tend to maintain the existing balance of control. Issues to new shareholders can shift the balance away from existing shareholders.	No change in degree of control unless dividends are in arrears (see above).	Control can be impeded by need to meet interest and capital payments and keep within any covenants imposed by lender.	
Liquidation of investment (ie can investor get out easily?)	Depends on whether the shares are traded on a stock exchange. Lack of marketability is likely to push up investors' required return.	If redeemable then this gives one way out (but probably on a fixed date). Otherwise as ordinary shares.	As preference shares.	
Personal tax position of investor	Dividends are subject to income tax at marginal rates depending on income level. Capital gains are taxed at flat rate of 18% or 28% depending on income level.	As ordinary shares.	As ordinary shares.	
Risk/reward	Both high.	Both lower.	Both lowest.	

2 Sources of equity finance

Section overview

- **Retained earnings**
  This is the main source of finance for most companies.
- **Rights issues**
  The law protects shareholders by requiring that any new issues are first offered to the existing shareholders.
- **New issues**
  Used by large companies looking to raise typically large amounts in a high profile (but expensive) manner.

There are broadly three methods of raising equity:

Method	Real world use
Retentions, ie retaining profits, rather than paying them out as dividends	By far and away the most important source of equity
Rights issues, ie an issue of new shares to existing shareholders	The next most important source
New issues to the public, ie an issue of new shares to new shareholders	The least important source of new equity

2.1 Retained earnings

The profits earned by a business can either be paid out to shareholders in the form of dividends or reinvested in the business. There is sometimes a misconception that because no new shares are being sold, using retained profits has no cost.

There may be no issue costs but shareholders will still expect a return on the funds re-invested in the business, ie they will expect the funds to be invested in projects which increase their wealth. Hence there is a cost to be borne.

Retentions (strictly pre-depreciation which isn't a cash flow) represent a very easy and important source of finance, particularly for young growing businesses where there may be a continual need for funds but where it is impractical to keep raising them using rights/new issues (and debt).

Chapter 7 on equity sources and dividend policy considers whether it matters, in terms of shareholder wealth, which source of equity finance is used.

2.2 Rights issues

Definition

A **rights issue** is an issue of new shares for cash to existing shareholders in proportion to their existing holdings.

Legally a rights issue must be made before a new issue to the public; existing shareholders have rights of first refusal (pre-emption rights) on the new shares and can, by taking them up, maintain their existing percentage holding in the company. However, shareholders can, and often do, waive these rights, by selling them to others. Shareholders can vote to rescind their pre-emption rights.

2.3 Impact of a rights issue

The price at which the new shares are issued is generally much less than the prevailing market price for the shares. This is to make the offer relatively attractive to shareholders and encourage them either to take up their rights or sell them so the issue is fully subscribed. It also acts as a safeguard should the market price of the company's shares fall before the issue is completed. If the price were to fall below the rights price, the issue would not be much of a success.

The ex-rights price, ie the price at which the shares will settle after the rights issue has been made, is calculated as follows (assuming that the rights proceeds are invested in a new project):

$$\text{Ex-rights price} = \frac{\text{market value of shares pre-rights issue + rights proceeds + project NPV}}{\text{number of shares ex-rights}}$$

$$= \frac{\text{PV of new total dividends}}{\text{number of shares ex-rights}}$$

If an examination question does not give the NPV of the project in which the funds are invested, assume it is nil.

Worked example: Theoretical ex-rights price

A company has 100,000 shares with a current market price of CU2 each.

It announces an increase in share capital to be achieved by a rights issue of one new share for every two existing shares. The rights price is CU1 per new share, thus raising CU50,000 for investment in the new project.

Requirements

(a) Work out the theoretical ex-rights price
(b) Calculate the value of the right to subscribe for each new share

Solution

(a)

	Each shareholder				Company as a whole	
Value of existing shares	2	at	CU2 =	CU4	100,000 at CU2 =	CU200,000
Value of capital injected by rights issue	1	at	CU1 =	CU1	50,000 at CU1 =	CU50,000
	3	shares		CU5	150,000	CU250,000

Theoretical ex-rights price = CU5/3 shares = CU1.66$^{2}/_{3}$ per share

(b) Value of the right to subscribe for each new share

= ex rights price – subscription price

= CU1.66 $^{2}/_{3}$ – CU1

= 66 $^{2}/_{3}$p

Value of a right per existing share = 66 $^{2}/_{3}$p / 2 = 33 $^{1}/_{3}$p

2.4 Impact of a rights issue on shareholder wealth

Does it make any difference to the wealth of an existing shareholder, whether they sell the rights, exercise the rights or simply do nothing?

Worked example: Impact of a rights issue on shareholder wealth

Assume a shareholder owns 1,000 shares in the company whose share value was described above.

- Pre-rights price = CU2
- Ex-rights price = CU1.66$^{2}/_{3}$p
- Subscription price = CU1

- A 1 for 2 rights issue

Requirement

Show the shareholder's position if:

(a) He takes up his rights

(b) He sells his rights for $66^{2}/_{3}$p per new share

(c) He does nothing.

Solution

(a) Takes up rights

		CU
Step 1: Wealth prior to rights issue	1,000 × CU2	2,000
Step 2: Wealth post rights issue		
Shares	1,500 × CU1.662/3	2,500
Less rights cost	500 × CU1	(500)
∴ No change		2,000

(b) Sells rights

		CU
Step 1: Wealth prior to rights issue	1,000 × CU2	2,000
Step 2: Wealth post rights issue		
Shares	1,000 × CU1.662/3	1,667
Sale of rights	500 × CU0.662/3	333
∴ No change		2,000

(c) Does nothing

		CU
Step 1: Wealth prior to rights issue	1,000 × CU2	2,000
Step 2: Wealth post rights issue	1,000 × CU1.66 2/3	1,667
∴ Loss of CU333		

In principle, the rights issue has no impact on shareholder wealth, unless the shareholder does nothing at all. The above example is, however, simplified as companies don't usually have rights issues unless they need the capital for some good reason – such as a project.

Interactive question 1: Rights issue to finance a project

[Difficulty level: Intermediate]

The above company raises the CU50,000 in order to take on a project with an expected NPV of CU25,000.

Summary of data

- Current market price is CU2 per share
- 100,000 shares currently in issue
- A 1 for 2 rights issue at CU1 will raise the CU50,000

Requirements

(a) What is the value of the company after the new project and the new issue?

(b) What is the ex-rights price per share and the value of the right?

(c) Assume a shareholder owns 1,000 shares. What is the effect on the shareholder's wealth if he:

(i) takes up his rights
(ii) sells his rights
(iii) does nothing

See **Answer** at the end of this chapter.

2.5 Changing the terms

In the above example, the terms of the issue were one new share (at a price of CU1) for every two shares currently held.

What difference would it make to shareholders' wealth if the terms were altered?

Interactive question 2: Changing the terms [Difficulty level: Intermediate]

The company in Interactive question 1 raises the required CU50,000 by issuing new shares on a one-for-one basis at 50p per new share. Show what would happen to the shareholder's wealth (from the worked example) if he

(a) Takes up his rights

(b) Sells his rights

See **Answer** at the end of this chapter.

You should have demonstrated that the terms and the price do not affect the shareholders who take up or sell their rights.

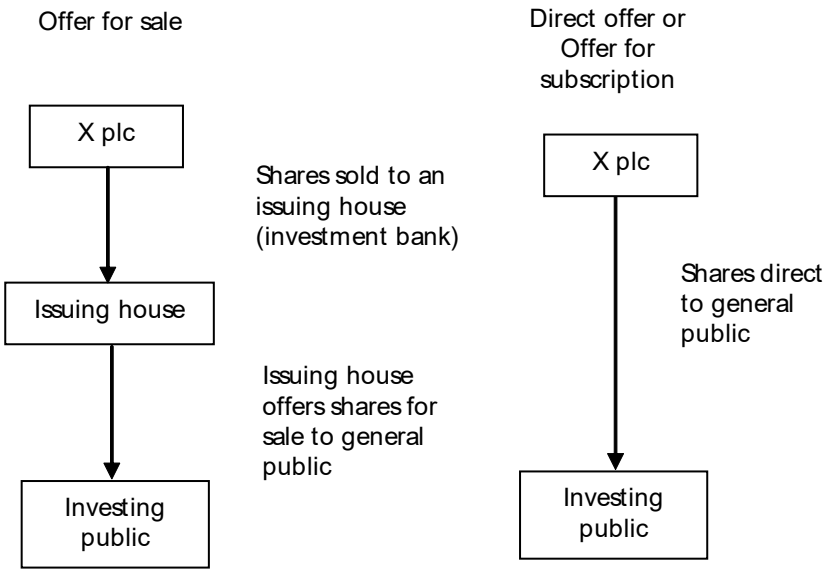
2.6 Factors to be considered when making rights issues

- Issue costs – these have been estimated at around 4% on CU2m raised but, as many of the costs are fixed, the percentage falls as the sum raised increases
- Shareholder reactions – shareholders may react badly to firms continually making rights issues as they are forced either to take up their rights or sell them (doing nothing decreases their wealth, as in the worked example above). They may sell their shares in the company, driving down the market price
- Control – unless large numbers of existing shareholders sell their rights to new shareholders there should be little impact in terms of control of the business by existing shareholders
- Unlisted companies – these often find rights issues difficult to use, because shareholders unable to raise sufficient funds to take up their rights may not have available the alternative of selling them if the firm's shares are not listed. This could mean that the firm is forced to use retentions or raise loans

2.7 New issues

These account for around 10% of new equity finance but when they occur they are often large in terms of the amount raised. They are often used at the time a firm obtains a listing on the Stock Exchange, and wants to raise a very large amount and therefore needs a high profile issue.

There are two methods of making a public offer, and they are best illustrated diagrammatically:



In practice the offer for sale is far more common; in either method the issue is likely to be underwritten (see below). There is no restriction on the amount of capital raised by this method.

2.8 Underwriting

Definition

Underwriting is the process whereby, in exchange for a fixed fee, usually 1–2% of the total finance to be raised, an institution or group of institutions will undertake to purchase any securities not subscribed for by the public.

In issues of securities which entail the public being invited to subscribe, there is a possibility that there will be insufficient demand for all securities to be sold. This possibility is an especially important consideration when a fixed issue price must be set in advance of the issue date and the market is volatile – in such cases there is a danger that market movements will make an offer unattractive at the time of its public announcement, even though it may have appeared attractive when being arranged.

Failure to sell all securities offered may undermine a firm's investment plans, especially where these concern a large, indivisible investment. Hence, underwriting is a form of insurance which ensures that all securities are sold and the firm can be certain of obtaining the funds required.

The main disadvantage of underwriting is its cost. The cost depends upon the characteristics of the company issuing the security and the state of the market. The cost is payable even if the underwriter is not called upon to take up any securities. Hence underwriting increases the cost of raising finance.

3 Sources of debt finance

Section overview

- Convertibles – debt with an equity 'kicker' making borrowing easier to secure.
- Leasing – a major source of funding for capital expenditure.
- Other forms of debt – relevant to a variety of organisations depending on the context.

Straightforward sources of debt finance, such as term loans and loan stock, were covered in the Business and Finance paper.

3.1 Convertible loans

Definition

Convertible loans are fixed return securities – either secured or unsecured – which may be converted, at the option of the holder, into ordinary shares in the same company. Prior to conversion the holders have creditor status, although their rights may be subordinated to those of trade payables.

3.1.1 Conversion rights are stated in terms of:

- A conversion ratio (ie the number of ordinary shares into which CU100 of stock may be converted); or
- A conversion price (ie the right to convert into ordinary shares at a price of X per share)

For example, 'CU100 of stock may be converted into 25 ordinary shares' is a conversion ratio; 'Stock may be converted into shares at a value of 400p per share' is the equivalent conversion price.

Sometimes the conversion price increases during the period of convertibility – this is done to stimulate early conversion. Another variation is to issue partly convertible stocks whereby only a portion of the stock – perhaps 50% – may be converted. Conversion rights usually cater for an adjustment to those rights in the event of capitalisation (ie a bonus issue), rights issues and so on.

From the investor's point of view, convertible stocks offer a low-risk security with the added advantage of an opportunity to study share price movements before deciding whether to invest in the equity.

3.1.2 The issuing company benefits by:

- Obtaining finance at a lower rate of interest than on ordinary debentures (provided that prospects for the company are good).
- Encouraging possible investors with the prospect of a future share in profits.
- Introducing an element of short-term gearing (covered in greater detail in Chapter 6).
- Avoiding redemption problems if the debt is converted into equity.
- Being able to issue equity cheaply (if converted).

3.2 Loan stock with warrants

These are loan stocks which cannot themselves be converted into equity but give the holder the right to subscribe at fixed future dates for ordinary shares at a predetermined price. The subscription rights are known as warrants.

The difference between a loan stock with warrants and a convertible debenture is that, with a warrant, the loan stock itself is not converted into equity, but bond holders make a cash payment to acquire the shares and retain their loan stock. This means that the loan stock will continue in existence until it is redeemed.

Warrants have value when the market price of shares rises above the price specified in the warrant. They are used as a 'sweetener' for debt issues, allowing the firm to place a low interest rate on the loan.

The cost to the firm is the right given to holders to buy equity at a (possibly) reduced price at the exercise date.

3.3 Loan documentation

3.3.1 Introduction

In section 1 above the risk-return trade off faced by shareholders and debt holders was introduced. Debt holders will typically face less risk, for which they expect a lower return.

How do they ensure that their position is low risk? To achieve this, they ensure there is adequate loan documentation.

3.3.2 Representations and warranties

Before a loan is made, a lender will want the borrower to give representations and warranties about their ability to borrow and repay any loan.

The borrower will therefore typically be required to answer questions ie make representations on a number of areas including the following.

Legality of borrowing	• Is the company incorporated? • Is the company legally allowed to borrow? • Is the signatory to the loan authorised to do so? • Is the loan within the provisions of the Memorandum and Articles of Association? • Does the loan breach any existing loan agreements?
Financial condition	• Do the accounts show a true and fair view etc? • Are there any impending court cases which would affect the company's financial position?

In the event that the borrower is found to be in breach of warranty in one of these areas, this is usually categorised as a default on the loan, which would normally trigger a demand for full repayment.

3.3.3 Guarantees

If the ability of the borrower to repay a loan is considered to be in doubt, the lender will require a guarantee. Any default would mean the lender could seek repayment from the guarantor.

Examples include:

- A parent company guaranteeing the loans of a subsidiary
- A subsidiary guaranteeing the loans of a parent: this **upstream guarantee** would be necessary if the parent has little or no trade but is simply a holding company. The subsidiaries have the ability to generate cash flows and they own the assets which can be used as security
- Members of a joint venture becoming guarantors for one another

3.3.4 Covenants

The borrower will need to commit to doing, or refrain from doing, various things in order to protect the lender's position.

Providing information	This can include financial statements, interim accounts, quarterly or monthly management accounts.
Negative pledge	The borrower pledges not to use its assets as security for other borrowings such that the position of other lenders would be improved at the expense of this lender.
Financial covenants	There are financial limits within which the borrower must trade. Examples include gearing ratio, interest cover and the net worth of the business. The loan documentation would need to define precisely how these limits are to be calculated.
Restrictions	The covenants will limit the ability of the business to take actions which might damage the lender's position. These will include restrictions on taking on more debt, paying dividends and making significant investments. These are explored further in Chapter 6.

These covenants will be tested periodically. This will invariably be when the annual financial statements are produced, but the lender may want information more frequently than once a year, in order to be alert to any issues that may be developing.

Interactive question 3: Funding a business through its growth phase

[Difficulty level: Intermediate]

Ian's Sandwich Empire

This one-person business starts up selling sandwiches from home and develops into a national business over time. Given the characteristics at each stage, suggest possible sources of funds.

Stage	Characteristics	Possible sources of funds
Start-up	Very small scale. Make at home. Deliver by car to local customers (offices, trading estates etc).	
Growth to CU100,000 revenue pa	Need small premises and a van.	
(Organic) growth to CU500,000 revenue pa	Need new larger premises with refrigeration and refrigerated vans.	
Growth to CU2 million revenue pa by acquisition	Established a brand/name/reputation and wants to expand regionally.	
Growth to CU5 million revenue pa	Want to use brand/name/reputation more widely – sell ready-made sandwiches to local independent retail outlets and local branches of national retail chains (using their brand) on credit.	
Growth to CU50 million revenue pa	Expand to national scale, by combination of organic growth and acquisition.	

See **Answer** at the end of this chapter.

4 International money markets

Section overview

- The **international money and capital markets** provide various possibilities in the form of financial instruments which the treasurers of *large* companies may use for borrowing or for financial investment.
- These instruments include **eurocurrency**, **eurobonds** and **euro-equity issues**.
- When deciding where to borrow, companies will consider **interest rates available**, the **amount of finance** that can be raised, and the **security** (if any) that has to be offered.

4.1 International financial markets

4.1.1 Who uses them?

Small and medium-sized companies and other enterprises are usually limited in their sources of finance to their domestic markets. Larger companies are able to seek funds in international financial markets. Funds are not only sought on these global markets by multinationals: funds from overseas might be used by larger companies to finance non-current asset acquisitions or working capital in domestic business operations.

4.1.2 What are they?

International money markets, sometimes called Euro markets, refers to dealing in funds outside their natural markets. For example raising a dollar loan from a London bank, or issuing bonds denominated in a currency different to the borrower's domestic currency.

The term 'Euro' arose because initially these markets developed in Europe. The main currency traded in these markets is the dollar, known as the 'Euro-Dollar'. Other currencies are also traded internationally outside their domestic systems, hence markets exist for 'Euro-Yen', 'Euro-Sterling', etc. It should be explained that the prefix 'Euro' refers to currencies traded outside their natural domestic market. It is a slightly misleading term, as euro currencies should not be confused with the euro, which is of course a currency in its own right.

4.2 International finance

Forms of finance available

The euro markets comprise markets for Euro currency, Euro credits, and Euro bonds. They are entirely wholesale, which means individuals and small companies do not play a direct role, but rather very large organisations such as banks make up the market.

Euro currency market	Normally refers to borrowing and lending by banks in currencies other than that of the country in which the bank is based. These are typically only available in major currencies eg US dollars or sterling, for which active markets exist.
Euro bond market	Refers to the trading of bonds denominated in currencies other than that of the country in which the bonds are sold. An important distinction between the Euro currency market and the Euro bond market is that in the former banks play an intermediary role between borrowers and lenders, whereas in the Euro bond market the role of intermediary is removed.
Euro credit market	This is sometimes called the medium-term Euro currency market. It refers to the market for medium to long term loans. Generally, Euro credit loans are offered by a large group or syndicate of banks, which allows the risk of default to be spread among many banks.

4.3 Factors to consider

The factors which are relevant to choosing between borrowing on the euromarkets or through the domestic system are as follows:

(a) **Spreads between borrowing and lending** are likely to be **closer** on the **euromarket**, because domestic banking systems are generally subject to tighter regulation and more stringent reserve requirements.

(b) **Euromarket** loans generally **require no security**, while borrowing on domestic markets is quite likely to involve fixed or floating charges on assets as security.

(c) Availability of euromarket funds is enhanced by the fact that **euromarkets are attractive** to **investors** as interest is paid **gross** without the deduction of withholding tax which occurs in many domestic markets. Also euromarket securities **can easily be sold on secondary markets**.

(d) With interest normally at floating rates on euromarkets, **draw-down dates** can be flexible, although there may be early redemption penalties. Commitment fees which ensure the bank must make the funds available if required have to be paid by the borrower, even if the full amount of the loan is not drawn down.

(e) It is often **easier** for a large multinational to **raise very large sums** quickly on the **euromarkets** than in a **domestic financial market**.

(f) The **cost of borrowing** on euromarkets is **often slightly less** than for the same currency in **home markets**.

(g) **Issue costs** are generally **relatively low**.

5 Ethics

Section overview

- What are the ethical requirements when working in corporate finance?

5.1 Introduction

When raising funds there are many advisors to whom a business can turn. These include the following:

- **Accountants** – most medium and large sized accountancy firms have their own corporate finance departments. An obvious lead into this form of advice is to be audited by a firm with a corporate finance specialisation
- **High street banks** – most of these have corporate finance departments
- **Merchant banks** – these specialise in helping businesses to obtain finance
- **Solicitors** – these provide advice on the legal aspects of fund-raising.

5.2 ICAB ethical guidance for accountants undertaking corporate finance work

5.2.1 Fundamental principles

The ICAB provides ethical guidance that will ensure that recipients of corporate finance advice can rely on the objectivity and integrity of the advice given to them by members. The guidance can be found at icab.org.bd and much of this is dealt with in the professional stage Audit and Assurance syllabus.

The guidance is applicable to both members in practice and members in business (e.g. accountants working for institutions providing funds for businesses).

Fundamental Principle 1 – "Integrity"

A member should behave with integrity in all professional and business relationships.

Integrity implies not only honesty but fair dealing, truthfulness and being straightforward. A member's advice and work must be uncorrupted by self-interest and not be influenced by the interests of other parties. A member should not be associated with information that is false or misleading or supplied recklessly.

Fundamental Principle 2 – "Objectivity"

A member should strive for objectivity in all professional and business judgements.

Objectivity is the state of mind which has regard to all considerations relevant to the task in hand but no other. There should be no bias, conflict of interest or undue influence of others.

Fundamental Principle 3 – "Professional competence and due care"

When providing professional services 'professional competence and due care' mean:

- Having appropriate professional knowledge and skill
- Having a continuing awareness and an understanding of relevant technical, professional and business developments

- Exercising sound and independent judgement
- Acting diligently, that is:
  - Carefully
  - Thoroughly
  - On a timely basis and
  - In accordance with the requirements of an assignment
- Acting in accordance with applicable technical and professional standards
- Distinguishing clearly between an expression of opinion and an assertion of fact

Fundamental Principle 4 – "Confidentiality"

The professional accountant should assume that all unpublished information about a prospective, current or previous client's or employer's affairs, however gained, is confidential. Information should then:

- Be kept confidential (confidentiality should be actively preserved)
- Not be disclosed, even inadvertently such as in a social environment
- Not be used to obtain personal advantage

Fundamental Principle 5 – "Professional behaviour"

Behaving professionally means:

- Complying with relevant laws and regulations
- Avoiding any action that discredits the profession (the standard to be applied is that of a reasonable and informed third party with knowledge of all relevant information)
- Conducting oneself with
  - Courtesy and
  - Consideration

When marketing themselves and their work, professional accountants should:

- Be honest and truthful
- Avoid making exaggerated claims about:
  - What they can do
  - What qualifications and experience they possess
- Avoid making disparaging references to the work of others

Activity categories

Categories of activity covered under corporate finance are as follows:

- General corporate finance advice
- Acting as adviser in relation to takeovers and mergers
- Underwriting and marketing or placing securities on behalf of a client; and
- Acting as sponsor or nominated adviser under the Listing Rules and the stock exchange rules respectively.

5.2.2 General principles applicable to all professional accountants (in practice and in business)

Statutory and other regulatory requirements

- Professional accountants must be aware of and comply with current legislative and regulatory measures and professional guidance governing corporate finance assignments.
- Professional accountants are required to comply with the Companies Act on Takeovers and Mergers.
- At the outset professional accountants should draw attention to the legislative and regulatory responsibilities which will apply to the client or his employer.
- The professional accountant should also draw attention to his own responsibilities under professional ethical guidance.

Interests of shareholders and owners

Professional accountants should have regard to the interests of all shareholders and owners unless they are specifically acting for a single or defined group thereof. This is particularly so when advising on a proposal which is stated to be agreed by directors and/or majority shareholders or owners.

Preparation of documents

- Any document should be prepared in accordance with normal professional standards of integrity and objectivity and with a proper degree of care.
- In order to differentiate the roles and responsibilities of the various advisers, professional accountants should ensure that these roles and responsibilities are clearly described in all public documents and circulars and that each adviser is named.

5.2.3 General corporate finance advice applicable to professional accountants in public practice

Corporate finance advice

The nature of corporate finance activities is so wide-ranging that all the threats to objectivity can arise when professional accountants in public practice provide corporate finance advice to both assurance and non-assurance clients: the self-interest threat, the self-review threat, the advocacy threat, the familiarity or trust threat and the intimidation threat.

When advising a *non-assurance* client there can be no objection to professional accountants in public practice accepting an engagement which is designed primarily with a view to advancing that client's case, though the professional accountant in public practice should be aware that the self-interest threat could arise.

Where a *non-assurance* client has received advice over a period of time on a series of related or unrelated transactions it is likely that, additionally, the familiarity or trust threats may exist. But where a professional accountant in public practice advises an *assurance* client which is subject to a takeover bid or where a professional accountant in public practice acts as sponsor or nominated adviser to an assurance client involved in the issue of securities, the self-interest threat will become more acute and the advocacy threat will arise.

Some corporate finance activities such as marketing or underwriting of securities contain so strong an element of advocacy as to be incompatible with the objectivity required for the reporting roles of an auditor or reporting accountant. Even where the activities of an auditor or reporting accountant are restricted to ensuring their clients' compliance with the Listing Rules or the Stock Exchange Rules, it is likely that a self-review threat could arise.

It may be in the best interests of a company for corporate finance advice to be provided by its auditor and there is nothing improper in the professional accountant in public practice supporting an assurance client in this way.

A professional accountant in public practice's objectivity may be seriously threatened if their role involves undertaking the management responsibilities of an assurance client. Accordingly, the professional accountant in public practice firm should ensure that the client takes full responsibility for the final decisions arising from any such negotiations.

Conflict of interest

Professional accountants in public practice shall be aware of the danger of a conflict of interest arising. All reasonable steps should be taken to ascertain whether a conflict of interest exists or is likely to arise in the future between a professional accountant in public practice and his clients, both with regard to new clients and to the changing circumstances of existing clients, and including any implications arising from the possession of confidential information.

Where a professional accountant in public practice acts or continues to act for two or more clients having obtained consent, safeguards will need to be implemented to manage any conflict which arises. The safeguards may include:

(a) The use of different partners and teams for different clients, each having separate internal reporting lines

(b) All necessary steps being taken to prevent the leakage of confidential information between different teams and sections within the firm

(c) Regular review of the situation by a senior partner or compliance officer not personally involved with either client; and

(d) Advising the clients to seek additional independent advice, where it is appropriate.

Any decision on the part of a sole practitioner should take account of the fact that the safeguards at (a) to (c) of the above paragraph will not be available to him. Similar consideration apply to small firms where the number of partners is insufficient to spread the work as indicated above.

Where a conflict of interest is so fundamental that it cannot be managed effectively by the implementation of appropriate safeguards and is likely seriously to prejudice the interests of a client, the engagement should not be accepted or continued even if all relevant clients consent to the engagement.

Where a professional accountant in public practice is required for any reason to disengage from an existing client, the professional accountant in public practice shall do so as speedily as practicable having regard to the interest of the client.

Documents for client and public use

In the case of a document prepared solely for the client and its professional advisers, it should be a condition of the engagement that the document should not be disclosed to any third party without the firm's prior written consent.

A professional accountant in public practice must take responsibility for anything published under his name, provided he consented to such publication, and the published document should make clear the client for whom the professional accountant in public practice is acting.

Underwriting and marketing of shares

A professional accountant in public practice who is an auditor or reporting accountant shall not deal in, underwrite or promote shares for their client. Involvement of this kind would give rise to an advocacy threat, self-review threat and self-interest threat such that the professional accountant in public practice's objectivity and independence would be threatened.

Sponsors and nominated advisers

Professional accountants in public practice's attention is drawn to:

- Bangladesh Listing Authority's Listing Rules when a firm accepts the responsibilities of a sponsor

Considerable care needs to be taken if a professional accountant in public practice is also to act as sponsor or nominated adviser to an assurance client. A threat to the objectivity of the auditor or reporting accountant can arise as the duties of a sponsor or nominated adviser are different from those of an auditor or reporting accountant and are owed to a different party. Although it is quite possible that no conflict will arise between the two roles, professional accountants in public practice need to recognise the possibility of conflicts arising, particularly if the role of sponsor or nominated adviser is to include any advocacy of the directors' views or if the transaction is to involve any issue of securities. To comply with the requirements above, where there is an issue of securities associated with such a transaction, a separate broker should be appointed to take responsibility for any underwriting or marketing of the company's shares.

6 Capital market efficiency

Section overview

- How does the Stock Exchange work?
- What is the efficient market hypothesis?
- What are the implications of market efficiency?

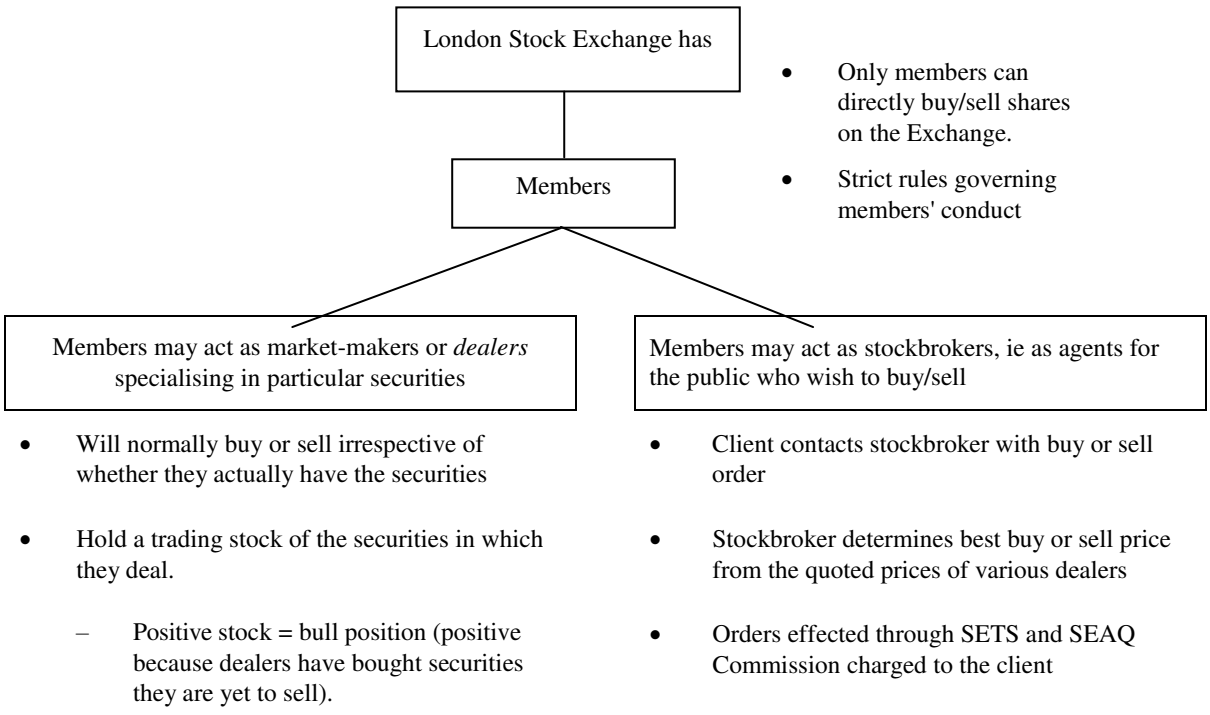
6.1 Introduction

The Stock Exchange provides access not only to new funds but also act as a market for dealing in 'second-hand' securities such as shares. This secondary function enables investors to liquidate their investment in ordinary shares, preference shares and debentures where these are quoted on the market. This makes investment more of an attractive proposition for investors and keeps down the cost to the company of such finance.

Investors will be keen to get a fair price for their investment. Prices on the market are fair if the market is efficient, ie the price reflects all known information about the business and its prospects.

This section briefly looks at how the Stock Exchange operates before considering its efficiency.

6.2 Workings of the Stock Exchange



– Negative stock = bear position (negative because dealers have sold securities they are yet to buy).

- Buying and selling effected through computerised systems such as SETS and SEAQ

6.3 Efficient market hypothesis

Introduction

- Efficient markets are assumed to exist by most of the models and theories in this manual, eg dividend valuation model, capital structure theory (M&M), dividend policy irrelevance and so on
- It is concerned with the information-processing efficiency of markets – particularly with the processing efficiency of the stock market in terms of share prices
- An efficient market is one where no positive net present value opportunities exist – basically it is a market where shares cannot be bought 'on the cheap' and sold on immediately at a profit. All share prices are 'fair' and investment returns are those expected for the risks undertaken. Information is rapidly and accurately incorporated into share values
- The efficient market hypothesis (EMH) is tested by considering three forms of efficiency – weak, semi-strong and strong – the difference being in terms of what information is reflected in share prices. The forms of efficiency are cumulative, ie if the market is semi-strong, it is also weak. If it is strong, it is also semi-strong and weak

(a) **Weak form efficiency**

How much information?

Share price reflects information about past price movements. Past movements do not help in identifying positive NPV trading strategies. Trading rules such as 'buy after three days down' and 'sell after five days up' should not work.

Share prices follow a random walk. This does not mean that prices go up and down arbitrarily but rise with good news and fall with bad news. The next movement depends on the next item of news – not past price movements or patterns. The next item could be good or bad with a 50:50 chance, ie random.

Tests

Tests indicate that 0.1% of a share price change on a particular day can be predicted with knowledge of the price change of the previous day. The remaining 99.9% is explained by other information (sometimes referred to as 'random walk research').

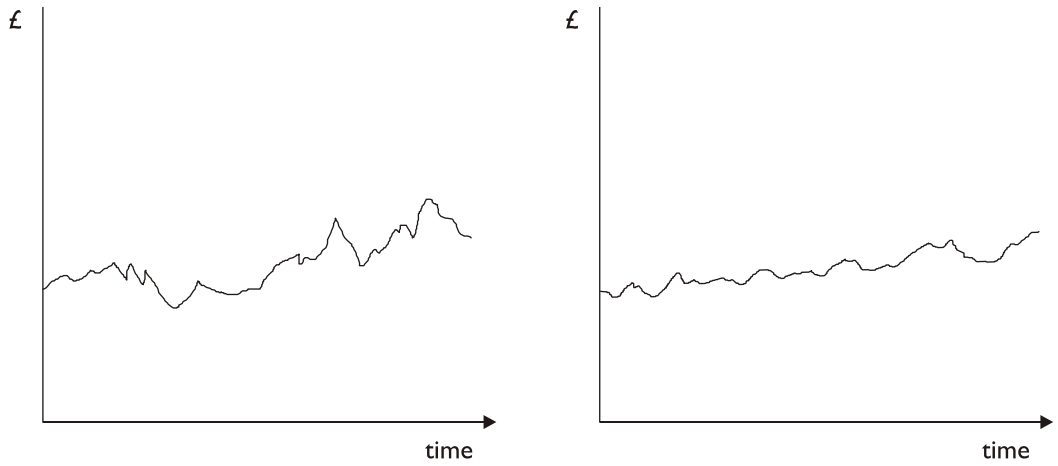
Implications if the market is weak form efficient

Future price movements cannot be predicted from past price movements. Chartists/ technical analysts incorrectly believe they can draw pictures and identify patterns.

Worked example: Weak form efficiency

Here are two graphs:

cu cu



One graph represents an experiment. You start with CU100. You toss a coin. Heads wins you CU20, tails loses you CU15. You toss the coin many times recording your change in wealth over time. Knowledge of how the coin has landed in the past will not help you predict what will happen in the future, ie the next move in wealth is up or down, 50:50 chance head or tails.

The other graph is what happens to your wealth if you invest CU100 in the FTSE all-share index.

Which is which?

Are you sure?

The fact that the two diagrams are so similar indicates that you cannot identify patterns ie predict future movements from past movements.

(b) **Semi-strong efficiency**

How much information?

Share prices incorporate all publicly available information (published accounts, press releases about earnings, dividends, new products, government economic data, etc).

Once it has been published or appeared in the papers nothing can be done about it as the share price will have already reacted to it! Such news is rapidly reflected in share prices.

Tests

Many of the tests have looked at individual share price returns around news release dates relative to the rest of the market returns. For example, the effect of dividend announcements which were better/worse than expected could be examined. Evidence suggests the stock market immediately and rationally incorporates such news in share prices ('immediately' means within 5-10 minutes).

Implications if the market is weak form and semi-strong form efficient

The market cannot be beaten by examining publicly available information – it will already be incorporated in share prices.

The market can only be beaten if an investor has inside information.

(c) **Strong form efficiency**

How much information?

Share prices reflect all information, published or not. No investor could beat the market by having superior information as it does not exist.

Tests

Company managers and other insiders have information they could trade on before it becomes public. In theory, publication would not affect the share price as the information is already incorporated. In reality individuals in the UK and US have been imprisoned and/or fined for insider dealing, ie they have exploited information which is not in the share price, negating the idea that markets are strong form efficient.

More importantly – can professional investors, eg investment fund managers, consistently beat the market by exploiting their (better) contacts with companies (particularly their FDs) which average investors do not

have? This has been tested by throwing 30 darts at the FT share listings and comparing the performance with 30 fund managers. Half the time the darts win (!). This and many other tests indicate that there is no evidence that 'professional' investors consistently have access to better inside information.

Implications if the market is efficient in all three forms

Investors cannot consistently beat the market but if it is not strong form efficient, then they can make money from insider dealing – and there is much evidence to suggest that the stock market is not strong form efficient.

6.4 Overall

The stock exchanges of all developed nations are regarded as at least semi-strong efficient for the shares traded actively on those markets.

Lessons of market efficiency

Markets have no memory

'Only issue shares when the share price is at a high' implies a pattern to price movements which can be used to time the issue of new shares, ie weak form efficiency does not hold. In fact as has been seen, the past is no guide to the future. Managers can time issues in relation to share price by using inside information (ie release good news, share price rises, issue new shares) but this relates to the future not past information.

Trust market prices

In an efficient market prices are fair – and cost of equity, debt etc calculations will produce a 'fair' result.

There are no financial illusions

Firms cannot fool the market! The market is concerned with company cash flows. Thus, manipulating accounting policies, eg depreciation to boost reported earnings, will not improve the share price (cash flows unchanged).

DIY alternative

In efficient markets investors will not pay companies for what they can do themselves, eg if one firm takes over another there will not be an increase in share price merely because of this transaction – the shareholders could have bought shares in the other company and achieved the same ends.

Shares are close substitutes

It should not be necessary to make new share issues at a substantial discount to the existing market price as long as the return offered is commensurate with the risk undertaken by the investor.

Reading the entrails

Share prices are a better guide to performance than published financial statements. This brings into question the value of ratio analysis.

Value of investment advice

As the market is generally considered to be semi-strong efficient, then:

- Technical analysis (Chartism) appears to be a waste of time
- Fundamental analysis (eg examining accounts, press releases etc) makes the market semi-strong efficient by affecting share prices, but any more analysis after the information has been incorporated into share prices is worthless

6.5 Practical observations about beating the market

If an investor thinks he can beat the market by:	The investor must be assuming that the market:
• Analysis of past price movement (Chartism)	is not efficient at all
• Gathering forecasts and watching a company's actions (investment banks and brokers analysts)	is (at most) weak form efficient
• Insider dealing	is (at most) semi-strong efficient
• Purely and only luck – there is no regular way to	is strong form efficient

beat the market

6.6 Investor relations

Semi-strong efficiency depends upon both the quantity and quality of publicly-available information. Companies that willingly make information available to investors may be valued more highly than those that do not and may, consequently, have a lower cost of capital because they are perceived to be less risky (cost of capital is covered in Chapter 5).

Pressure from investors as well as government, accountancy bodies and the Stock Exchange may 'encourage' those less willing to improve the flow of information.

7 Behavioural finance

Section overview

- Why are some decisions not made on a rational basis?
- How do biases, emotions and different attitudes affect investors?

Introduction

Behavioural finance is an alternative view to the efficient market hypothesis. It attempts to explain the market implications of the psychological factors behind investor decisions and suggests that irrational investor behaviour may significantly affect share price movements. These factors may explain why share prices appear sometimes to overreact to past price changes.

As such investors are subject to a number of behavioural tendencies that can lead to decisions that are not rational. These behavioural tendencies impact investors' decisions which questions the validity of the efficient markets hypothesis.

7.1 Overconfidence

Investors tend to overestimate their trading abilities and gloss over the areas in which they lack knowledge. This can lead to them making bad investments. They are also likely to overestimate the accuracy of their forecasts, such as predicted earnings. Investors may then be surprised by, for example earnings announcements, because their predictions were overambitious.

Overconfidence can be linked to self-attribution bias. This means that investors will attribute their successes to their own skills, but their failures will have been caused by bad luck rather than themselves. Overconfidence leads investors to think they can beat the market.

7.2 Representativeness

Representativeness occurs when judgements are based too heavily on a representative observation and don't take into account numerous other factors, such as statistical evidence. As an example when there is a sharp decline in the stock market there will be articles showing that the fall in the index level is similar to that of the Wall Street crash of 1929. Although this statistic may be accurate, it may mislead investors to believe that there will be a repeat of the Great Depression of the 1930s. The fundamental economic differences between the two situations are overlooked in favour of the one similarity.

Representativeness can also explain why some investors think that past performance can be used to indicate future performance, when in reality the link is generally a poor one.

7.3 Narrow framing

Investors can suffer from 'narrow framing' if they are unable to look at the broader picture. For example an investor can focus on the price movement of a single share instead of looking at the whole portfolio. Similarly investors may worry about short-term performance when their goal is to fund long-term retirement savings. Looking at the broader picture, it should be seen that in the long run, a well-diversified portfolio should grow in value, despite some short-term fluctuations.

7.4 Miscalculation of probabilities

Research has shown that investors attach too low a probability to likely outcomes and too high a probability to unlikely outcomes. This can help to explain stock market bubbles such as the 'dotcom' bubble as investors overestimated the potential of the internet start-ups and their ability to dominate their market segments.

7.5 Ambiguity aversion

Investors are afraid of areas that they do not have much information on and instead they prefer the familiar, which they believe they know well. This can help to explain why investors avoid overseas shares when, rationally, international diversification brings benefits to the investor.

7.6 Positive feedback and extrapolative expectations

Positive feedback investors buy shares after their prices have risen and sell them after prices fall. They build extrapolative expectations about the share prices, expecting prices to continue rising (or falling). Some informed traders use this behavioural tendency to their advantage by joining in and pushing rising prices higher and then selling at a profit before the price falls. This creates instability in the market and means the share price has diverged from its realistic value. This behaviour can create stock market bubbles.

7.7 Cognitive dissonance

If an investor has a long-held belief, they will continue to hold it even if evidence completely contradicts this belief. This can lead to investors holding shares that they believe will increase in value when the evidence overwhelmingly suggests otherwise.

This tendency contributes towards an effect known as 'post-earnings announcement drift' which shows that the reaction to unexpectedly good or bad earnings figures is slower than suggested by the efficient markets hypothesis.

7.8 Availability bias

Individuals may pay particular attention to one fact or event because it is freshest or most prominent in their mind. The bigger picture is ignored, although it is likely to be based on sound probabilities rather than the emotion attached to the one fact or event. For example, if some high-profile companies in the nuclear energy sector produce some poor results, then investors might abandon the entire sector and ignore the potential that there are some good companies available at low prices.

7.9 Conservatism

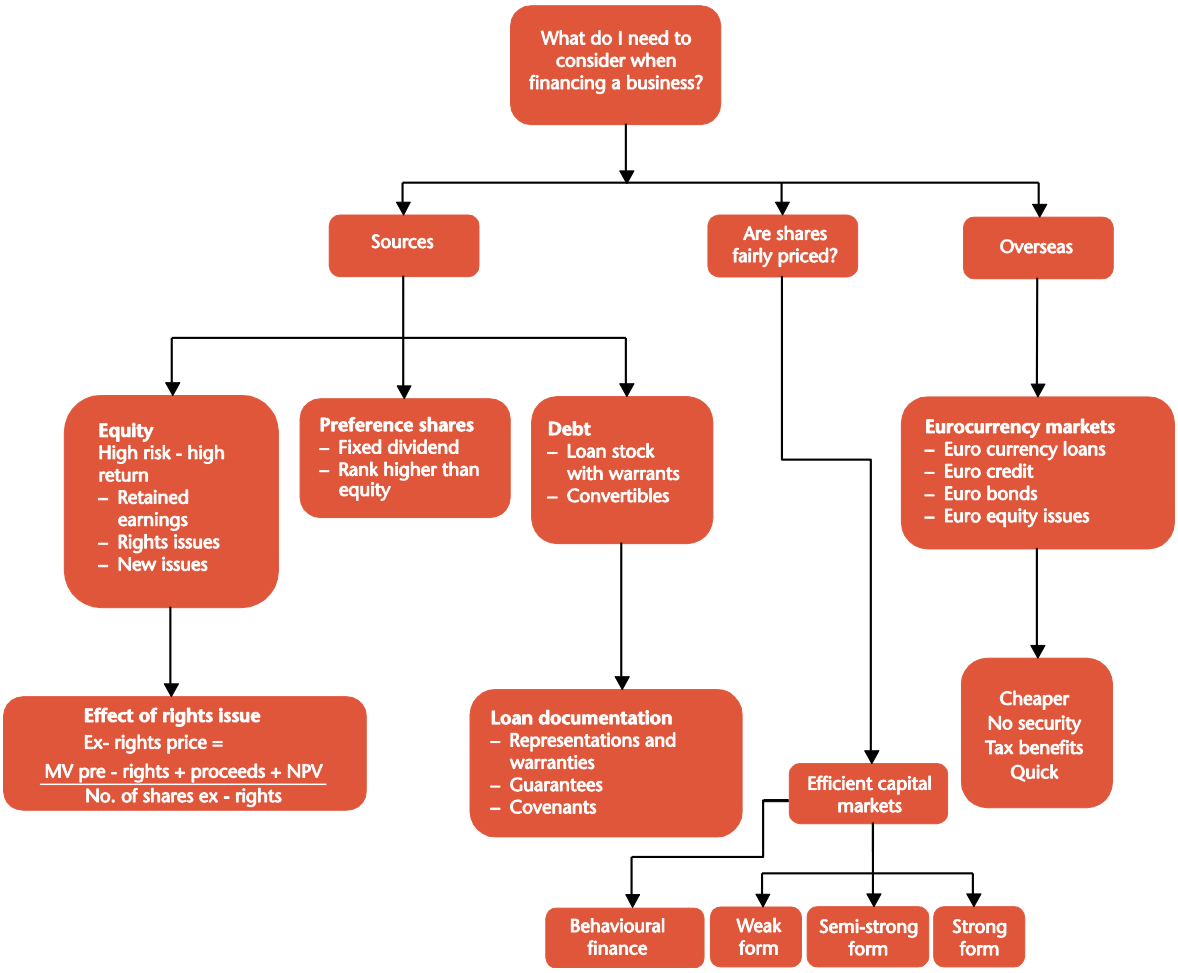
Investors tend to be naturally conservative and resistant to changing an opinion. As a result, if profits turn out to be higher than expected, they will underreact and not adjust subsequent profits expectations. This means that one profits announcement surprise is followed by another.

7.10 Overall

Despite these behavioural tendencies, investors tend to be viewed as flawed rational thinkers rather than as completely irrational. These investors attempt to be rational, but have limitations in their memory, emotion and cognitive function which lead them to repeat mistakes.

Summary and Self-test

Summary



Self-test

Answer the following questions.

1 Sutton Ltd has announced a 1 for 3 rights issue at a subscription price of CU2. The current cum-rights price of the shares is CU3.04.

What is the theoretical value (to the nearest penny) of the right per existing share?

2 A company, whose shares currently sell at CU75 each, plans to make a rights issue of one share at CU60 for every four existing shares.

What is the theoretical ex-rights price of the shares after the issue?

3 An all-equity financed company has in issue 50 million shares with a nominal value of CU0.50 per share and a market value of CU1.05 per share. The company is contemplating raising CU10 million via a rights issue with a subscription price of CU0.80 per share in order to finance a project with a net present value of CU2.5 million.

Assuming that the market is semi-strong efficient, what will be the new market price of a share following the rights issue?

4 MOORGATE COMPANY

The Moorgate Company has issued 100,000 CU1 equity shares which are at present selling for CU3 per share. The company has plans to issue rights to purchase one new equity share at a price of CU2 per share for every four shares.

Requirements

(a) Calculate the theoretical ex-rights price of Moorgate's equity shares. **(5 marks)**

(b) Calculate the theoretical value of a Moorgate right before the shares sell ex-rights. **(5 marks)**

(c) The chairman of the company receives a telephone call from an angry shareholder who owns 1,000 shares. The shareholder argues that he will suffer a loss in his personal wealth due to this rights issue, because the new shares are being offered at a price lower than the current market value.

The chairman assures him that his wealth will not be reduced because of the rights issue, as long as the shareholder takes appropriate action.

(i) Is the chairman correct?

(ii) What should the shareholder do?

Prepare a statement showing the effect of the rights issue on this particular shareholder's wealth, assuming

(i) He sells all the rights

(ii) He exercises half the rights and sells the other half

(iii) He does nothing at all. **(10 marks)**

(d) Are there any real circumstances which might lend support to the shareholder's claim? Explain.**(5 marks)**

(25 marks)

5 EASTERWAYS LTD

Easterways Ltd is a listed company involved in the tourist trade. The company wishes to make an offer for a smaller rival business, Tinytours Ltd. Since it is believed that the Tinytours Ltd shareholders would only accept cash, a relatively large amount of cash will have to be raised. A share issue seems a realistic possibility for achieving this. The directors are undecided between making a public issue or a rights issue of shares. They are also unsure about the price at which shares should be issued.

One of the directors has suggested that a convertible loan stock issue might be worth considering. The directors are adamant that a conventional loan is out of the question.

Requirement

Prepare a report for the directors explaining the major factors that relate to their decision, including the points about which the directors are uncertain. **(11 marks)**

6 STOCK MARKET EFFICIENCY

The following statement contains several errors with reference to the three levels of market efficiency.

'According to the efficient market hypothesis all share prices are correct at all times. This is achieved by prices moving randomly when new information is publicly announced. New information from published accounts is the only determinant of the random movements in share price.

Fundamental and technical analysis of the stock market serves no function in making the market efficient and cannot predict future share prices. Corporate financial managers are also unable to predict future share prices.'

Requirement

Explain the errors in the above statement. **(10 marks)**

7 MARKET STATEMENTS

The statements shown below have been made in respect of the Dhaka Stock Exchange or of particular securities traded in that market.

Requirements

Critically comment on each of the following three statements, clearly explaining any technical terms contained within them or used by you.

(a) 'In view of the fact that the market is efficient in the semi-strong form, financial information released by companies is of no value to investors, because the information is already included in share prices before it is released'. **(4 marks)**

(b) 'If an investor holds shares in about 20 different companies all of the risk is eliminated and the portfolio will give a return equal to the risk-free rate'. **(5 marks)**

(c) 'A graph of the daily price of a share looks similar to that which would be obtained by plotting a series of cumulative random numbers. This shows clearly that share prices move randomly at the whim of investors, indicating that the market is not price efficient'. **(3 marks)**

(12 marks)

Now go back to the Learning Objectives in the Introduction. If you are satisfied you have achieved these objectives, please tick them off.

Answers to Interactive questions

Answer to Interactive question 1

		CU
(a)	Value of the company now is 100,000 × CU2	200,000
	Increase in value due to new shares being sold	50,000
	Impact of new project being taken on = NPV	25,000
	Value of company after issue and project	275,000

(b) Ex-rights price $= \dfrac{\text{MV of shares* pre-rights issue} + \text{rights proceeds} + \text{project NPV}}{\text{number of shares ex-rights}}$

$$= \frac{(100{,}000 \times CU2) + (50{,}000 \times CU1) + CU25{,}000}{100{,}000 + 50{,}000}$$

$$= CU1.83^{1}/_{3}$$

Value of the right = $CU1.83^{1}/_{3} - CU1.00 = CU0.83^{1}/_{3}$

* If the market price of the existing shares had been given post the announcement of the project, then the project NPV of CU25,000 would already be included in the MV of the old shares (see market efficiency).

(c) (i) Takes up rights

		CU
Step 1: Wealth prior to rights issue	1,000 × CU2	2,000
Step 2: Wealth post rights issue	1,500 × CU1.831/3	2,750
Less Rights cost	500 × CU1	(500)
		2,250

∴ CU250 better off

(ii) Sells rights

Step 1: Wealth prior to rights issue	1,000 × CU2	2,000
Step 2: Wealth post rights issue		
Shares	1,000 × CU1.831/3	1,8331/3
Sale of rights	500 × CU0.831/3	4162/3
		2,250

∴ CU250 better off

(iii) Does nothing

Step 1: Wealth prior to rights issue	1,000 × CU2	2,000
Step 2: Wealth post rights issue	1,000 × CU1.831/3	1,8331/3

∴ Loss of CU1662/3

Answer to Interactive question 2

Number of shares issued = 100,000

Amount raised = 100,000 × 50p = CU50,000

Ex-rights price $= \dfrac{(100{,}000 \times CU2) + (100{,}000 \times CU0.50) + CU25{,}000}{100{,}000 + 100{,}000}$

$= CU1.375$

Value of the right = CU1.375 – CU0.5 = 87.5p

(a) Take up rights

		CU
Wealth prior to rights issue	1,000 × CU2	2,000
Wealth post rights issue	2,000 × CU1.375	2,750
Less Rights cost	1,000 × 50p	(500)
		2,250

∴ CU250 better off

(b) Sells rights

		CU
Wealth prior to rights issue	1,000 × CU2	2,000
Wealth post rights issue		
Shares	1,000 × CU1.375	1,375
Sale of rights	1,000 × CU0.875	875
		2,250

∴ CU250 better off

Thus the terms and price do not affect shareholders who take up or sell their rights – they gain the same amount.

Answer to Interactive question 3

Stage	Characteristics	Possible sources of funds
Start-up	Very small scale. Make at home. Deliver by car to local customers (offices, trading estates etc).	Savings or second mortgage on home. Borrow from family and friends (no security or past record, so bank reluctant to lend).
Growth to CU100,000 revenue pa	Need small premises and a van.	Borrowing from bank to purchase premises (secured by premises and personal guarantees) or lease premises. Possibly grant, but unlikely as not innovating, employing people in an area of high unemployment (eg former coalfield) or manufacturing.
(Organic) growth to CU500,000 revenue pa	Need new larger premises with refrigeration and refrigerated vans.	Borrowings from bank secured by premises or lease. Become a limited company (Ltd) and bring in new shareholders/money. Possibly grant, as it may be possible to site the new premises in an area offering grants to create employment.
Growth to CU2 million revenue pa by acquisition	Established a brand/name/reputation and wants to expand regionally.	(Secured) bank borrowings remain. Acquisition is higher risk; main possibilities: • Issue more shares. • Venture capital or business angels (although they tend to prefer bigger deals than this). • Loans (at higher interest than bank, acknowledging the higher risk and lack of security).
Growth to CU5 million revenue pa	Want to use brand/name/reputation more widely – sell ready-made sandwiches to local independent retail outlets and local branches of national retail chains (using their brand) on credit.	Main sources likely to be: • Continuing bank borrowings (secured). • Venture capital or business angels. (Now at a viable size for this) • Loans/debentures. • Invoice discounting (now they have receivables and they are reputable).
Growth to CU50 million revenue pa	Expand to national scale, by combination of organic growth and acquisition.	Convert to public limited and float on Stock Exchange.

Answers to Self-test

1 New MV ex-div per share $= \frac{3 \times CU3.0 + 4 \times CU2}{4}$

$= CU2.78$

Value of a right to buy a share worth CU2.78 for CU2.00 = CU0.78

Value per existing share $= \frac{CU0.78}{3}$

$= CU0.26$

2 $\frac{CU7 \times 54 + CU60}{5} = CU72.00$

3 New share price $= \frac{50m \times CU1.05 + CU10m \times CU2.5m}{50m + 12.5m}$

$= CU1.04$

4 MOORGATE COMPANY

(a) Ex-rights price

	CU
4 existing shares × CU3.00	12.00
1 rights share × CU2.00	2.00
	14.00

The theoretical value of Moorgate's shares ex-rights is

$\frac{cu\ 14.00}{5} = CU2.80$

(b) Value of right

Value of a right = CU(2.80 – 2.00)
= CU 0.80

One right enables a holder to buy a share at CU2.00 which will eventually sell for CU2.80. The value of the right to buy one share is, therefore, CU0.80. Four existing shares are needed to buy one additional share. Therefore, the theoretical value of the rights attached to each existing share is CU0.20.

(c) Chairman's views

The chairman is correct. The shareholder should either exercise the rights or sell them (subject to (d) below).

(i) If he sells all rights

	CU
Wealth before rights issue	
Value of shares 1,000 × CU3.00	3,000
Wealth after rights issue	
Value of shares 1,000 × CU2.80	2,800
Plus cash from sale of rights 1,000 × CU0.20	200
	3,000

(ii) If he exercises one half of his rights and sells the other half

	CU
Wealth before rights issue	
Value of shares 1,000 × CU3.00	3,000
Wealth after rights issue	
Value of old shares 1,000 × CU2.80	2,800
Value of new shares (500 ÷ 4) × CU2.80	350
Cash from sale of rights 500 × CU0.20	100
	3,250
Less Cost of purchasing new shares 125 × CU2	(250)
	3,000

(iii) If he does nothing

	CU
Wealth before rights issue	
Value of shares 1,000 × CU3.00	3,000
Wealth after rights issue	
Value of shares 1,000 × CU2.80	(2,800)
Reduction in wealth	200

(d) Shareholder wealth

It is possible that the shareholder, even though exercising the rights or selling them, will suffer a reduction in wealth.

The above analysis is based on the assumption that the funds to be raised by the new issue of shares will be invested in the business to earn a rate of return comparable to the return on the existing funds. The stock market, in valuing the shares of Moorgate after the rights issue, has to make some assumption as to how profitably the new funds are to be used. For example, if the new funds were squandered, the overall return on equity funds would fall and the price would drop below the CU2.80 calculated above.

Alternatively, if the proceeds are to be used to finance a highly profitable investment and the stock market does not initially appreciate this point, then the market in arriving at a price of CU2.80 ex-rights will be undervaluing the share. When the true earning potential of the company were realised, the share price would rise. However, by then it might be too late for the shareholder referred to in the question.

If the shareholder exercises the rights in the circumstances just described he will not lose. When the shares rise in price he will benefit. However, if at the time of the rights issue he decides to sell the shares, he will lose. The value of the right in the circumstances described is based on the assumption that the new funds will earn as much as the old. Later the person who exercises the rights will benefit, when the shares rise in price above that expected at the time of issue.

Tutorial note: No mention is made of the use to which the funds will be put. It can only be assumed therefore that they will earn the same return as the firm's existing operations and hence each new share will increase the value of the firm by CU2.00. This is a good demonstration of the old examination adage – 'if in doubt assume the simplest'! The use to which the funds will be put should be discussed in part (c).

5 EASTERWAYS LTD

REPORT

To	The Board of Easterways Ltd
From	Mark Green, Financial consultant
Date	12 September 20X2
Subject	Financing the Tinytours Ltd takeover

Terms of reference

To advise the board on various approaches to raising equity finance for the takeover of Tinytours Ltd.

For the purposes of this report it is assumed that neither retained earnings nor a conventional loan is a possible means of raising the necessary cash.

A public issue of equity

This amounts to the company selling shares, normally through an intermediary, to the general investing public. This is a relatively rare event except when a newly-listed business is seeking a wider ownership for its shares. Once listed, companies tend not to use public issues. This is for several reasons.

- Public issues are expensive. The issue costs (legal, administrative etc) can be very costly; 10% or more of the value of the funds raised, though there are economies of scale so that large issues are proportionately cheaper
- Setting the issue price is difficult and important. Even if the price is set at what is believed to be a realistic level, there is still the possibility that there will be insufficient demand to ensure the sale of all the shares. This is particularly the case when markets are volatile. When not all the shares are sold, the company is in danger of falling short of its target level of funds. Underwriting is an option to ensure that all shares are sold which will enable the firm to reach its target. The main problem with underwriting is that it is very expensive and the fees are payable even if the underwriters do not have to buy any outstanding shares.
- Control of the company could pass from the existing shareholders

Since existing shareholders have the right to be offered shares first, those shareholders can, in effect, block a public issue in favour of a rights issue.

Rights issues

A rights issue is one to the existing shareholders where each shareholder is given the 'right' to take up a number of new shares which represents a proportion of the existing holding. Shareholders who do not wish to take up their rights can usually sell the right to another investor who will be able to take up the rights instead. For an established listed company, rights issues are much more popular for the following reasons.

- Rights issues are relatively cheap to make, perhaps less than half as expensive as a public issue
- The issue price is relatively unimportant. Since all existing shareholders benefit from the cheap price in proportion to their shareholding, there is no disproportionate gain. The company needs to make the rights price significantly cheaper than the market price. This puts pressure on shareholders to take up the shares or to sell them to an investor who will. Thus rights issue tend not to fail, ie the shares tend to be issued and the required cash raised
- Control tends to stay with the existing shareholders

It seems as if a rights issue would provide a cheaper and more practical way for the company to raise the funds for the Tinytours takeover than would a public issue.

Convertible loan stock issue

Convertibles are a mixture of loan and equity financing. They are issued as loan stocks with the right to convert them into equity shares of the same company at some pre-determined rate and date.

From the investors' point of view they are relatively safe, in that there is a close-to guaranteed interest payment periodically and a right to convert to equity if it is beneficial to do so.

From the company's viewpoint they are attractive because

- They are cheap to issue; loan stock is generally cheap to issue, so it becomes, if all goes well, a cheap way of issuing equity
- Loan finance is relatively cheap to service because of the tax-deductibility of interest charges
- They are self-liquidating; provided the holders convert, the loan liquidates itself through an equity issue, which saves the company the problem of raising the cash to replace the expiring loan stock

Disadvantages of any type of loan financing include

- The likely need to provide security for the loan
- The possibility that lenders will impose covenants, for example restricting the level of dividends and/or insisting on a minimum liquidity ratio

Raising finance, unless it is from a mixture of debt and equity, will affect the level of gearing, with probable implications for the risk/return profile and the cost of capital.

6 STOCK MARKET EFFICIENCY

The efficient market hypothesis is often considered in terms of three levels of market efficiency.

(a) Weak form efficiency
(b) Semi-strong form efficiency
(c) Strong form efficiency

The accuracy of the statement in the question depends in part upon which form of market efficiency is being considered. The first sentence states that all share prices are correct at all times. If 'correct' means that prices reflect true values (the true value being an equilibrium price which incorporates all relevant information that exists at a particular point in time), then strong form efficiency does suggest that prices are always correct. Weak and semi-strong prices are not likely to be correct as they do not fully consider all information (eg semi-strong efficiency does not include inside information).

It might be argued that even strong form efficiency does not lead to correct prices at all times as, although an efficient market will react quickly to new relevant information, the reaction is not instant and there will be a short period of time when prices are not correct.

The second sentence in the statement suggests that prices move randomly when new information is publicly announced. Share prices do not move randomly when new information is announced. Prices may follow a random walk in that successive price changes are independent of each other. However, prices will move to reflect accurately any new relevant information that is announced, moving up when favourable information is announced, and down with unfavourable information.

If strong form efficiency exists, prices might not move at all when new information is publicly announced, as the market will already be aware of the information prior to public announcement and will have already reacted to the information.

Information from published accounts is only one possible determinant of share price movement. Others include the announcement of investment plans, dividend announcements, government changes in monetary and fiscal policies, inflation levels, exchange rates and many more.

Fundamental and technical analysts play an important role in producing market efficiency. An efficient market requires competition among a large number of analysts to achieve 'correct' share prices, and the information disseminated by analysts (through their companies) helps to fulfil one of the requirements of market efficiency, ie that information is widely and cheaply available.

An efficient market implies that there is no way for investors or analysts to achieve consistently superior rates of return. This does not say that analysts cannot accurately predict future share prices. By pure chance some analysts will do so. However, the implication is that analysts will not be able to do so consistently.

The same argument may be used for corporate financial managers. If, however, the market is only semistrong efficient, then it is possible that financial managers, having inside information, would be able to produce a superior estimate of the future share price of their own companies and that, if analysts have access to inside information, they could earn superior returns.

Tutorial note: Stock market efficiency is a very broad concept and in questions it is sensible to 'pin down' the levels of efficiency you are discussing. After that it is merely a matter of challenging each phrase at a time.

7 MARKET STATEMENTS

(a) A stock market is described as efficient when the price of a particular security is adjusted instantly by the market to take account of new information. There are three grades of efficiency currently used, although a market could be between them. The weak form of the efficient market hypothesis states that the only information which is fully reflected in the share price is the trends which can be deduced from previous share prices; the semi-strong form states that the market price of a security already reflects all public information about the company; the strong form includes private information as well.

It is generally held that Dhaka Stock Exchange is approximately semi-strong, ie the market price of a security will reflect all public information which is relevant. As new information becomes available that price will change. Financial information, as one example, will give the market more information to judge whether the security is under or overpriced, resulting in trading which will adjust its price. Thus information is useful to investors as it is likely to affect the market price when it becomes public.

The second part of the quote in the question implies strong form efficiency and is contrary to semi-strong efficiency where information is of value to investors – it is impounded in share prices when released.

(b) It is possible for an investor to pick carefully about 20 investments in different sections of the stock market and by doing so maintain a well-diversified portfolio. It is important however, that the investments are carefully chosen from different sectors, rather than simply 20 different shares.

A well-diversified portfolio means a collection of shares which, together, roughly resemble, in their returns and risks, the whole stock market. Risk means the possible fluctuations in return on an

investment around the average. By putting together a portfolio, or collection of investments, with returns which do not move in the same way, it is possible to reduce the risk below that of a single investment.

In a well-diversified portfolio the risk in the portfolio is reduced. The remaining risk is called the market or systematic risk. It is therefore not true to say all the risk is eliminated as only the unsystematic risk (ie that part of the fluctuations in possible returns on a security not due to changes in the system) will be eliminated in the portfolio.

As there is still some risk, it is also incorrect to say that the portfolio will give a return equal to the risk-free rate (the return expected from an investment with no risk, such as short-term government gilts); the return, will be substantially higher than the risk-free rate to compensate for the risk of investing in the stock market.

(c) The concept of price efficiency and the efficient market hypothesis have been explained in (a). It would be true to say that in general the daily price movements of a share look random in relation to each other and that no relationship can be deduced. This does not, however, mean that share prices are random in relation to the information released to the market, and a clear connection can be deduced between the information released and the direction and size of the change in the share price.

If the stock market is semi-strong efficient, the share price movements will still appear random but will react in a predictable manner to any new information becoming public. Information released is random, so movements which reflect that information will appear to be random.

An investor holding information which is not yet public, or guessing at it, would therefore be able to predict a future share price movement when that information becomes public.

CHAPTER 5

Cost of capital

Introduction

Examination context

Topic List

1 Cost of equity

2 Cost of debt

3 Combined cost of capital or weighted average cost of capital

Summary and Self-test

Answers to Interactive questions

Answers to Self-test

Introduction

Learning objectives

	Tick off
• To calculate the cost of equity capital using the dividend valuation model	☐
• To estimate growth rates based on historic dividends and on retention rates	☐
• To estimate the cost of equity using the CAPM	☐
• To estimate the costs of preference and debt capital	☐
• To adjust the cost of debt to reflect the effects of taxation and redemption	☐
• To combine various costs of capital into a weighted average, having regard to what the appropriate weightings are	☐
• To determine when it is correct to use a weighted average cost of capital	☐

The syllabus references that relate to this chapter are 1k, 3c.

Syllabus links

Cost of capital extends the basic ideas of return on capital employed introduced in Business and Finance at Knowledge level. This topic combines with basic investment appraisal from Management Information to allow both financing and investment decisions to be explored simultaneously.

There is further technical development of the topic at advanced level in Business Change.

Finally, the case study may require analysis which utilises a cost of capital in determining answers to business issues.

Examination context

In the examination, you may be required to calculate a cost of capital – be it equity, preference shares, debt or an overall weighted average. The basis of the calculation may form a discussion, either on its own or combined with an exploration of business or financial risk.

1 Cost of equity

Section overview

- Underlying concept is that risk and return are linked.
- Cost of equity (k_e) of a company is same as the returns required by an investor.
- The Dividend Valuation Model (DVM) assumes share price equals the present value of future dividends.
- Growth can be estimated using historic growth rates or retention rates.
- The DVM has weaknesses due to both the assumptions made and the data used.
- The CAPM is an alternative method of estimating k_e.

1.1 Categories of long-term finance

These have already been summarised as:

- Equity shares
- Preference shares
- Debt

These will be examined in turn so as to establish both a rationale and a procedure for calculating the cost of each source of finance. Subsequently an approach to establishing a combined (weighted average) cost of capital will be examined.

1.2 Calculating returns

The cost of each source of long-term finance can be equated with the return which the providers of finance expect on their investment. The return can be expressed as an interest rate and this will be used as the overall measure of cost, ie the cost of money is the percentage return a firm needs to pay its investors. Essentially, the calculation is that of an internal rate of return (IRR) where

Market value of investment = Returns on investment discounted at investors' required rate of return

1.3 Determinants of the cost of finance

The two major determinants of a company's cost of finance are:

- The risk-free rate of return or a rate of return that reflects the time value of money.
- The reward for the risk taken by investors in advancing funds to the firm. For example, equity holders take more risks than debt holders, and therefore expect higher rates of return.

1.4 The dividend valuation model

1.4.1 What gives a share value?

The primary financial objective is assumed to be to maximise the wealth of equity shareholders.

If we view wealth as the value of the shares, it is necessary to have a theory as to what determines the value of an ordinary share.

The benefit to shareholders from owning a share takes the form of future dividends and capital gain. It is the present value of these benefits that creates the price today.

Thus:

Price of shares now (P_0) = Present value of future dividends + present value of share price on eventual sale.

1.4.2 What determines the share price on eventual sale?

For an individual to make a capital gain, he must find another investor prepared to buy at the higher price. Why should that other investor be prepared to do so? Obviously only in the expectation of enhanced dividends and a possible capital gain for himself.

However, the second capital gain in turn depends on finding yet another investor prepared to buy at the higher price – and so on. Ultimately it can be seen that capital gains and losses are merely transfers of existing wealth between members of the market. The only addition to the total wealth of the market as a whole, and therefore, the only determinant of current value, are the dividends paid by the company, including any terminal dividend on liquidation.

Thus the current share price is totally determined by the anticipated dividends, discounted at the investor's required rate of return (the cost of equity).

P_0 = Present value of future dividends

1.5 The pattern of future dividends

In order to arrive at a price, the future dividends need to be estimated. The most convenient assumptions are that **dividends either remain constant**, or **grow at some fixed annual rate, g**. It can be shown that the market value of equity (share price × number of shares) can be expressed in relatively straightforward terms. Working from the method of valuing a perpetuity;

Dividends remain constant:

$$P_0 = \frac{D_0}{k_e} \qquad \text{or } k_e = \frac{D_0}{P_0}$$

Dividends grow at constant rate, g:

$$P_0 = \frac{D_0(1+g)}{k_e - g} \qquad \text{or } k_e = \frac{D_0(1+g)}{P_0} + g$$

(referred to as the Gordon Growth model in the exam formulae sheet)

Where P_0 = ex-dividend (see section 1.6) market value of equity

D_0 = dividend paid at time 0

k_e = equity investors' required rate of return

In this model it is assumed that dividends are paid at annual intervals. *Note that one result of this model is that if dividends grow at a rate 'g' per annum then so does the share price.*

There are obvious flaws in such simple models of anticipated dividend behaviour. In particular, note the following points:

- g must be less than k_e. If g equals ke the share price becomes infinitely high, a nonsense result. However, note that a growth rate this high *to perpetuity* is impossible.
- In practice companies are likely to experience periods of varying growth rates. More sophisticated models have been developed to cope with such forecasts, but they do not need to be considered computationally, for the purpose of the exam.

The pattern of future dividends is usually referred to as the *dividend stream*.

Interactive question 1: Dividend valuation model (Gordon growth model)

[Difficulty level: Intermediate]

A company's shares are quoted at CU2.50 ex-div. The dividend just paid was 50p. No growth in dividends is expected and dividends are forecast to continue indefinitely.

(a) What rate of return, k_e, do the investors anticipate?

(b) Using the data above, but with an anticipated annual growth rate in dividends of 10%, what is k_e?

(c) Investors in a company are known to require a rate of return of 15%. Current dividends are 30p per share, just paid. No increase is anticipated.

Estimate the share price.

(d) As in (c), but dividends are expected to grow at 5% pa.

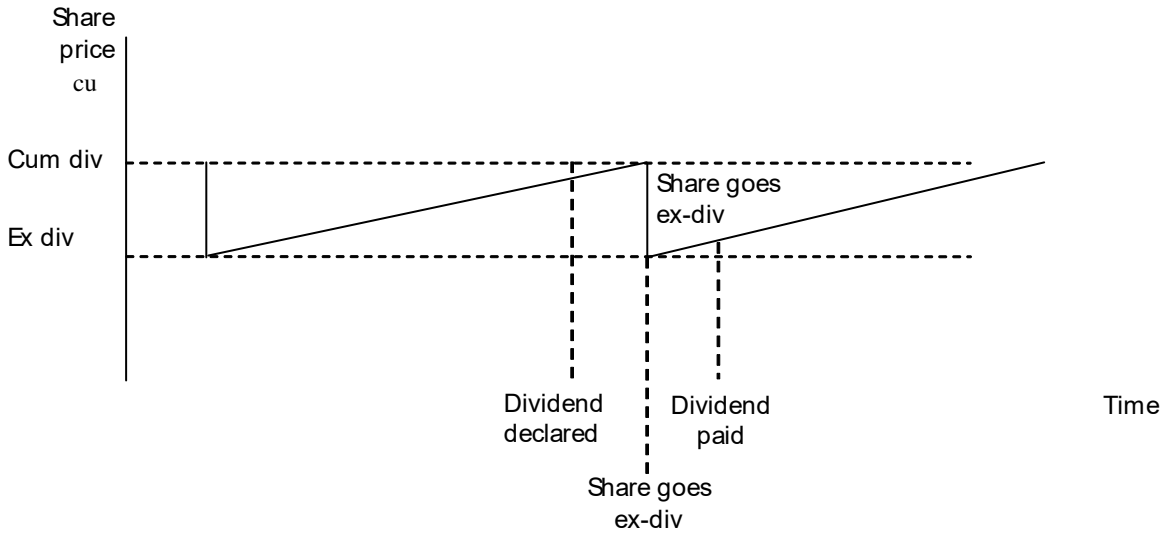
Again, find P_0.

See **Answer** at the end of this chapter.

1.6 Cum-div and ex-div share prices

Dividends are paid periodically on shares. During the period prior to the payment of dividends, the price rises in anticipation of the payment. At this stage the price is cum-div. This may be expressed diagrammatically.

It will be noted that the share goes ex-div shortly before the dividend is paid. Any person acquiring the share after this point will not receive the dividend, which will be paid to the original shareholder. The reason is that the time it takes for the company to amend its register of members requires a cut-off point before the dividend is paid. Thus, when a share is quoted cum-div, the price includes both the underlying ex-div value of the share and the dividend due shortly. As the dividend valuation model considers the present value of future dividends, the ex-div share price for P_0 must be used.



Interactive question 2: Cost of equity 1 [Difficulty level: Easy]

The market value of a company's shares is CU2.20. It is about to pay a dividend of 20p, which is expected to remain constant in future.

Requirement

What is the cost of equity?

See **Answer** at the end of this chapter.

Interactive question 3: Cost of equity 2 [Difficulty level: Easy]

A company currently pays a dividend of 12p which is expected to grow at 5% per annum. The ex-dividend share price is CU1.75.

Requirement

What is its cost of equity?

See **Answer** at the end of this chapter.

1.7 Estimating growth rates

(a) **Historical pattern**

The anticipated growth rate, g, is an unknown, representing a subjective estimate made by individual investors. It cannot be calculated precisely, but an important factor in investors' estimates will be the historical pattern of growth in dividends. However, the past is often a weak indicator of the future.

Worked example: Evaluating future growth based on historic growth

Assume the following data has been assembled concerning the net dividend per share paid in the last five years:

Year	*Dividend per share*
	p
20X1	1.00
20X2	1.10
20X3	1.20
20X4	1.34
20X5	1.48

Solution

An approximate average period growth rate can be taken by averaging the growth rates of the individual years:

Period				
20X1 – 20X2	$\frac{1.1}{1.0} - 1$	=	0.100	
20X2 – 20X3	$\frac{1.2}{1.1} - 1$	=	0.091	
20X3 – 20X4	$\frac{1.34}{1.2} - 1$	=	0.117	
20X4 – 20X5	$\frac{1.48}{1.34} - 1$	=	0.104	
			0.412	÷ 4 = 0.103 or 10.3%

A more direct compound growth calculation would be:

$$1.0 \times (1 + g)^4 = 1.48$$

$$(1 + g) = \sqrt[4]{\frac{1.48}{1.0}}$$

$$g = 1.103 - 1 = 0.103 = 10.3\%$$

Interactive question 4: Estimating growth rates [Difficulty level: Intermediate]

A company has paid the following dividends over the last five years:

	Pence/share
20X0	100
20X1	110

20X2	125
20X3	136
20X4	145

Requirement

Estimate the growth rate and the cost of equity if the current ex-div market value is CU10.50/share.

See **Answer** at the end of this chapter.

(b) **Earnings retention model**

This growth estimate is based on the idea that retained profits are the only source of funds. With no re-invested profits, the investment base of the company would not increase. Practically, this means no new funds invested in new products, new markets, new factories, stores and so on. Therefore, profit will not grow, and by implication dividends (taking a long-term view) will not grow.

Growth therefore comes about by **retaining** and reinvesting profits on which a **return** is earned. The relationship between these variables is shown by:

$g = rb$

Where: g = growth in future dividends

r = the current accounting rate of return

b = the proportion of profits retained

If all measures are constant, then it may be shown that g, the rate of growth of dividends, is equal to the rate of growth of profits is equal to the rate of growth of share price and so on. Given sufficient data, you may be required to estimate a growth rate based on the above model, as illustrated below.

Worked example: Use of Earnings retention model

Consider the following summarised financial statements for XZ Ltd:

BALANCE SHEET AS AT 31 DECEMBER 20X1

	CUm		CUm
Assets	200	Ordinary shares	100
		Reserves	100
	200		200

Profit after tax for the year ended 31 December 20X2	CU20m
Dividends (a 40% payout)	CU8m

BALANCE SHEET AS AT 31 DECEMBER 20X2

	CUm		CUm
Assets	212	Ordinary shares	100
		Reserves CU(100 + (20 – 8))	112
	212		212

If the company's accounting rate of return and earnings retention rate remain the same, what will be the growth in dividends in the next year?

IAS 1 changes the titles of financial statements as they will be used in IFRSs. Balance sheet becomes 'statement of financial position', income statement becomes 'statement of comprehensive income' and cash flow statement becomes 'statement of cash flows'. As entities are not required to use the new titles, existing and new names are equally acceptable.

Solution

The 20X2 profit after tax as a percentage of opening capital employed $= \frac{\text{£20m}}{\text{£200m}} = 10\%_{\text{CU}}^{\text{CU}}$.

Applying this to the end-20X2 capital employed (10% × CU212m), gives a profit for 20X3 estimated at CU21.20m.

Therefore, the dividends for 20X3 will be 40% × CU21.20m = CU8.48m, representing a growth of 6% on the previous year's dividends.

Normally, this is more directly calculated by the following equation:

g = r(accounting rate of return) × b(earnings retention rate) = 10% × 60% = 6%

Problems with the Earnings retention model

Note that the accounting rate of return is calculated with reference to *opening* balance sheet values.

The major problem with this model is:

- Its reliance on accounting profits
- The assumption that r and b will be constant
- Inflation can substantially distort the accounting rate of return if assets are valued on an historical cost basis
- The model also assumes all *new* finance comes from equity

Interactive question 5: Applying the Earnings retention model

[Difficulty level: Intermediate]

A company has 300,000 ordinary shares in issue with an ex-div market value of CU1.35 per share. A dividend of CU50,000 has just been paid out $_{cu}$ post-tax profits of CU75,000.

Net assets at the year end were valued at CU1.06m.

Requirement

Estimate the cost of equity.

See **Answer** at the end of this chapter.

1.8 Shortcomings of the dividend valuation model (DVM)

Whilst the basic premise of the DVM is perhaps reasonable, being that a share is worth more if it pays out higher future dividends, there are a few problems with the underlying assumptions and with the data used.

- Underlying assumptions
  - Shares have value because of the dividends . This is not *always* true – some companies have a deliberately low payout policy which can attract investors who prefer capital gains to an income stream. Some companies pay no dividends at all, for example Microsoft up until recently paid no dividends but Microsoft shares weren't worth nothing.
  - Dividends either do not grow, or grow at a constant rate – the former is unrealistic, the latter is true in the long term if one takes the view we are estimating a long-term average. Nevertheless, short-term variations in growth would change the value.
  - Estimates of future dividends based on historic data eg growth rate, retention rates, implicitly assume dividend patterns will remain unchanged – it would be more useful to consider the future facing a company when making this estimate, eg market conditions, investor confidence, economic conditions and so on.
- Data used
  - The share price is used in the DVM to help estimate the cost of equity to the company or the required rate of return to the investor.

    Share prices change on a daily basis, and not always in a perfectly efficient or rational manner. For example, the share price of a small company, with a dominant family as shareholders and little trading, may have a more erratic share price than a FTSE 100 company whose shares trade in a very active market.
  - The growth in future dividends.

This is perhaps more likely to be linked to the growth in future earnings, than to past dividends. Earnings do not feature as such in the dividend valuation model. However, earnings should be an indicator of the company's long-term ability to pay dividends and therefore, in estimating the rate of growth of future dividends, the rate of growth of the underlying profits must also be considered. For example, if dividends grow at 10% while earnings grow at 5%, before long the firm will run out of funds with which to pay dividends. Similarly, if dividends grow at 5% and profits at 10%, the firm will soon accumulate excess funds.

1.9 Impact of bonus issues and rights issues

Bonus (or scrip or capitalisation) issues raise no new money for a company. Shareholders are given more shares in proportion to their existing holdings. The total value of all the company's shares does not change but the value per share drops in proportion to the additional shares. The fall in price (supposedly) makes the shares more attractive to buy/sell.

Care needs to be taken in estimating dividend growth rates when a bonus issue has taken place.

Worked example: Bonus issue

Year	*20X1*	*20X2*	*20X3*
Total dividend (CUm)	100	105	111
Total number of shares (m)	50	50	100
Dividend per share (CU)	2	2.1	1.11

A 1-for-1 (1:1) bonus issue was made in 20X3.

The dividend per share figures might indicate negative growth in 20X3, but what has happened is that the number of shares has doubled – there is no extra cash to invest in new projects to generate extra dividends.

To calculate growth for the dividend valuation model the simplest thing to do is to go back in time and adjust the number of shares in 20X1 and 20X2 for the bonus issue.

Thus

Year	*20X1*	*20X2*	*20X3*
Total number of shares (m)	100	100	100
Dividend per share (CU)	1	1.05	1.11

To find the growth over the two years:

$$1\,(1+g)^2 = 1.11$$

$$(1+g)^2 = 1.11$$

$$1+g = 1.0535$$

$$g = 5.35\%$$

No such adjustment is necessary for rights issues as this does produce an inflow of funds for investment in new projects, increasing future dividends.

1.10 CAPM and the cost of equity

1.10.1 Recap of concept

In Chapter 3, the CAPM was introduced as one way of estimating the required return on a share and thus the cost of equity capital for a company. The basic idea behind the CAPM is to assess how risky the business is, and 'price' that risk accordingly.

The Capital Asset Pricing Model (CAPM) provides a relationship between risk and return:

$k_e = r_f + \beta_j (r_m - r_f)$

Where: β_j = the beta which measures a share's (systematic) risk
r_m = the return on the market
r_f = the risk free rate of interest

CAPM can be used as an alternative to the dividend valuation model for deriving the cost of equity.

Either $k_e = \frac{D_0(1+g)}{P_0} + g$ or $k_e = r_f + \beta_j (r_m - r_f)$

Worked example: CAPM

Bloggins Ltd is an all equity company with a $\beta_j = 1.10$

The risk free rate is 4% pa and the return on the market is estimated at 11% pa

Requirement

Calculate Bloggins' cost of equity.

Solution

$k_e = 4\% + 1.1\ (11\% - 4\%)$

$k_e = 11.7\%$

1.10.2 Estimation of the discount rate for a capital investment project

How do we estimate the beta factor of a new capital investment project?

One way to do so is by examining the betas of quoted companies in a similar line of business to the new project.

At first sight this method appears to be easy. For example, a firm wishes to appraise a new project which involves setting up a small chain of retail food shops. Thus it examines the betas of quoted companies which are involved in food retailing and finds the average to be 0.8. It therefore considers that a suitable beta for the new project is 0.8.

Unfortunately things are not this simple. The quoted companies the firm examines may be engaged in several lines of business besides food retailing, and are also financially geared to different extents. Both these factors affect the beta of a firm. However, there are ways round these problems, and this method remains one of the most practical ways of arriving at a project beta. Calculations involving different gearing levels are explored in chapter 6.

1.11 Cost of preference shares

Preference shares usually have a constant dividend. So, using the perpetuity valuation formula:

$k_p = \frac{D}{P_0}$

Where: D = constant annual dividend
P_0 = ex-div market value

Preference dividends are normally quoted as a percentage. Thus 10% CU1 preference shares will provide an annual dividend of 10% of the CU1 *nominal* value (*not* of the market value).

Interactive question 6: Cost of preference shares [Difficulty level: Intermediate]

A company has 100,000 12% preference shares in issue, nominal value CU1.

The current ex-div market value is CU1.15/share.

Requirement

What is the cost of the preference shares?

See **Answer** at the end of this chapter.

---

2 Cost of debt

Section overview

- The cost of irredeemable debt can be assessed using much the same approach as for shares.

- The cost of redeemable debt requires an IRR estimated by interpolation.
- The effect of taxation is to reduce the cost of debt.
- Convertible debt requires an assessment of whether the debt will be converted or redeemed.

2.1 Introduction

The underlying principle of the DVM above was that the value of the investment equalled the present value of the cash flows received.

The same principle is used to identify the cost of debt capital.

In simple terms:

$P_0 = \frac{D_0}{k_e}$ – for ordinary shares where dividends are constant

$P_0 = \frac{D_0}{k_p}$ – for preference shares

$P_0 = \frac{Interest}{k_d}$ – for bonds

Where P_0 = Price of the bond

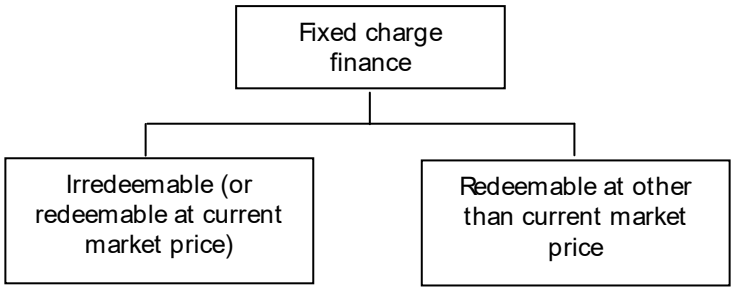
Interest = Interest paid on the bond

k_d = Required return of debt holder (= cost of debt if no tax)

(This assumes the bond is irredeemable)

2.2 The two computational problems

Solely from a computational point of view, there are two different aspects to the problem:



The computational problems differ, and are dealt with below. In either case the following point should be borne in mind – the objective is to find the cost of capital in annual compound interest terms.

2.3 Irredeemable securities

If securities are irredeemable, the company does not intend to repay the principal but to pay interest **for ever**. In this case the present value of a perpetuity equation may be used as introduced above:

$P_0 = \frac{Interest}{k_d}$

Where P_0 = Present value

Interest = Annual interest (starting in one year's time)

k_d = Cost of debt (with no tax)

Worked example: Irredeemable debt

Irredeemable debt is quoted at CU40% and the coupon (nominal) interest rate is 5%.

What is the return on the security?

Notes

- The term 'CU40%' means that CU100 nominal value can be purchased for CU40
- The nominal or coupon rate of 5% means investors will receive CU5 pa for each CU100 nominal value of debt security purchased.

  The return on this investment = $\frac{£5}{£40}\ \frac{CU}{CU} = 0.125$ or 12.5%

- Put another way if the debt pays CU5 pa and investors require a 12.5% return, the debt is worth $\frac{£5}{0.125}\ \frac{}{CU} =$ CU40
- By paying only CU40 for the debt, investors have forced the return up to 12.5%. Presumably they would not pay CU100 for it as this would give them a return of only:

  $\frac{CU\,5}{CU\,100} = 5\%$

- CU40 is the current market value of the debt. If it had originally been issued at CU100, then its historical return would have been 5% (the 'coupon rate'). More importantly, if the company were to raise new debt, it would now cost 12.5%

Worked example: Securities redeemable at current market price

If the debt were to be redeemed at CU40 in three years' time, what would the investors' return be?

Instead of enjoying a return of CU5 from year 4 to infinity, they would receive CU40 repayment at year 3. The present value of CU5 per year from year 4 to infinity in year 3 terms is:

$\frac{CU\,5}{0.125}$ = CU40, ie the same as the redemption amount.

Therefore, the rate of return is the same – still 12.5%.

Thus, in summary, where:

either (a) The debt is irredeemable;
or (b) The current market price equals the redemption price

then:

Cost to company = return to investor = $\frac{\text{annual interest payment}}{\text{market price}} = \frac{\text{Interest}}{P_0}$

This ignores taxation. The effect of tax is explored in section 2.5 below

---

2.4 Securities redeemable at other than current market price

Where there is a difference between the current market price and the redemption price, there are two elements to the cost of that security:

- Interest payments, ie an income return;
- A capital gain or loss represented by the difference between the current market price and the redemption price.

Worked example: Redeemable debt

If a company's debenture stock is quoted at CU65.75%, coupon interest is 9% pa just paid, and redemption is in ten years' time at par, then what is the cost of the debt capital as an annual rate using trial and error and linear interpolation?

Solution

The objective is to find a way of expressing this situation in terms of an interest cost.

The total return is referred to as the 'gross redemption yield'. In practice bond yield tables would be used, but the examination requires the ability to calculate the gross redemption yield from first principles.

In general, if the debt is redeemable in n years' time, the cost is the **internal rate of return** of the following cash flows:

t_0 = Market value

$t_1 - t_n$ = Interest

t_n = Redemption price

	Cash flows	15%	PV	20%	PV
	CU	factor	CU	factor	CU
t0	(65.75)	1	(65.75)	1	(65.75)
t1 – t10	9.00	5.019	45.17	4.192	37.73
t10	100.00	0.247	24.70	0.162	16.20
			4.12		(11.82)

Since this is positive, increase to 20%

$$\text{Cost of debt} = 15\% + \frac{4.12}{4.12 + 11.82} \times (20 - 15)\% = 16\%$$

2.5 Effect of taxation

An important aspect in evaluating the cost of finance is the effect of tax. Loan interest is an allowable expense for corporation tax, effectively reducing the cost of loan finance to the company.

Worked example: Effect of taxation

Consider two companies, A Ltd and B Ltd, with identical operating profits of CU100,000 on which they pay corporation tax at 21%. However, B Ltd has in issue CU50,000 of debentures on which it is paying 20% interest (CU10,000 per annum).

Requirement

How does tax influence the cost of debt?

	A Ltd	B Ltd	Difference (A – B)
	CU	CU	CU
Operating profit	100,000	100,000	
Interest		(10,000)	(10,000)
Profit before tax	100,000	90,000	
Tax @ 21%	(21,000)	(18,900)	2,100
Earnings available for equity	79,000	71,100	(7,900)

The effective interest cost to the company is CU7,900, or 15.8% of the CU50,000 debentures. This may be expressed in a general form, where k_d is the after-tax cost and T the corporation tax rate.

Net of tax cost of debt, k_d = Pre-tax cost of debt (1 – T)

In this example k_d = 20% (1 – 0.21) = 15.8% (as above).

The adjustment is only valid for irredeemable loan stocks or those redeemable at current market price, assuming immediate tax relief.

$$k_d = \frac{\text{Interest } (1 - T)}{P_0}$$

Interactive question 7: Effect of taxation

[Difficulty level: Intermediate]

12% irredeemable debentures with a nominal value of CU100 are quoted at CU92 cum interest. The rate of corporation tax is 21%.

Requirements

(a) Find the gross return required by the debenture holders
(b) Find the net of tax cost to the company.

See **Answer** at the end of this chapter.

2.6 Taxation and premium on redemption

Where there is a premium on redemption, the tax position is more complex. The procedure is to calculate an internal rate of return on the pre-tax cash flows. This is also known as the gross redemption yield. The post-tax cost of debt is then calculated by multiplying the gross redemption yield by (1 – T). Thus, the pre-tax cost is the internal rate of return of the following cash flows:

t_0 = ex-interest market value

$t_1 – t_n$ = interest

t_n = redemption price

Interactive question 8: Taxation and premium on redemption

[Difficulty level: Intermediate]

A company has 10% debentures in issue quoted at CU98 ex interest. The debentures will be redeemed in five years at a premium of 5% compared to the nominal value.

Corporation tax rate = 21%

Requirement

What is the cost to the company if interest is paid annually?

See **Answer** at the end of this chapter.

2.7 Convertible debentures/loan stock

Convertible debentures/loan stock allow the investor to choose between taking cash on redemption or converting the debentures into a pre-determined number of shares.

Step 1 Calculate the value of the conversion option using available data.

Step 2 Compare the conversion option with the cash option. Assume all investors will choose the option with the higher value.

Step 3 Calculate the IRR of the flows as for redeemable debentures.

Note: There is no tax effect whichever option is chosen at the conversion date.

Interactive question 9: Loan stock

[Difficulty level: Intermediate]

A company has in issue 8% convertible loan stock currently quoted at CU85 ex interest. The loan stock is redeemable at a 5% premium in five years' time, or can be converted into 40 ordinary shares at that date.

The current MV ex div of shares is CU2/share with a dividend growth of 7%.

Requirement

What is the cost to the company of the loan stock?

Corporation tax = 21%.

See **Answer** at the end of this chapter.

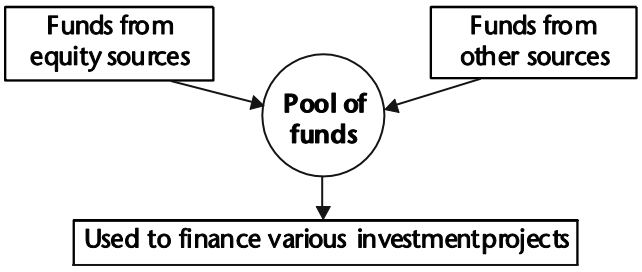
3 Combined cost of capital or weighted average cost of capital

Section overview

- The WACC is the cost of the pool of funds – both equity and debt – within a business.
- The weightings should reflect the future capital structure of the company.
- The weightings should be based on market values.
- Calculation of the WACC assumes no changes in the financial or systematic risk of the company.

3.1 The concept of a weighted average cost of capital

In the analysis carried out so far, each source of finance has been examined in isolation. However, in practice, funds for businesses come from various sources. There is not normally any separation between funds from different sources and their application to specific projects.



In order to provide a measure for evaluating these projects, the cost of the pool of funds is required. The general approach is to calculate the cost of each source of finance, then to weight these according to their importance in the financing mix. This is referred to as the combined or weighted average cost of capital (WACC).

3.2 The choice of weights

The importance of each source of finance in the mix may be measured in various ways.

Weights based on proposed financing versus historical finance mix

As has already been discussed, the cost of capital should reflect future costs of finance, because in decision-making concern is only with the future. Weights based on the future financing mix would therefore seem to be the logical choice. However, caution must be exercised. Consider the following illustration.

Worked example: Weightings in the WACC

Sport Ltd has traditionally raised funds in the proportion 50% equity : 50% debt. Consultants have estimated from current market data that these sources of finance have the following costs:

Cost of equity	20%
Cost of debt	10%

Sport Ltd is appraising a new project costing CU1 million which it intends to finance entirely by a new issue of debt.

(a) What discount rate should it use to appraise the project?

(b) If 50% equity: 50% debt is considered the best mix, why use just debt for the new project?

(c) If just debt is being used, why not discount the project using the cost of debt?

(d) What are the likely implications for the cost of equity, and thus the WACC, if the debt increases significantly such that the long term gearing changes?

Solution

(a) This depends upon what is assumed.

The most likely situation is that **in the long run** the firm will maintain **its historical mix** and raise funds in the proportion 50% equity : 50% debt. Presumably the firm has traditionally used these proportions as it considers them to give the 'best' mix of finance.

In this case the weighted average cost of capital (WACC) will be as follows:

Proportion of equity funding × cost of equity + Proportion of debt funding × cost of debt

= 0.5 × 20% + 0.5 × 10% = 15%

(b) If a capital structure of 50% equity and 50% debt is considered the best mix, why is the firm raising new funds entirely by debt? The most likely answer is that transaction costs would make the issue of small amounts of debt and equity prohibitively expensive. The firm would therefore raise debt on this occasion, and equity on the next round of fund-raising, aiming to keep its *long-run* structure at 50:50. This is a common practice and investors would understand the firm's approach.

(c) Discounting using the cost of debt, ie 10%, is inappropriate because this represents the risk to the lenders and not that of the project.

Using specific costs of capital in this way would mean that a project with an IRR of 15% would be accepted if the cash were to come from a new issue of debt but rejected if from a share issue.

(d) If the firm were to change to long-run proportions of finance involving much higher levels of debt, then the underlying costs of funds would probably change. Equity holders would see their position as being much more risky (as large amounts of debt interest would need to be paid before they received a dividend) and debt investors would have little security for their loans. Both would ask for higher returns to compensate for the increased risk and the figures given in the illustration could well change.

What would be the result?

Suppose that financing the new project entirely by debt signals the firm's intention to change to a new financing mix of 75% debt : 25% equity. Investors react to this change by adjusting their required returns to:

Cost of equity	22%
Cost of debt	12%

The new combined cost of capital would then be:

$0.25 \times 22\% + 0.75 \times 12\% = 14.5\%$

In this case the move has been beneficial, resulting in a lower combined cost of funds. The most important point, however, is that the costs of debt and equity have changed, and in this situation the original estimates above, which were based on the current level of gearing, cannot be employed.

Substantial changes in the long-run financing mix can change the costs of funds. This will be investigated in more detail in the next chapter on capital structure.

3.3 Conclusion

The cost of an individual source of finance should not be associated with an individual project. In the above example it would be incorrect to discount project returns at the cost of debt because it was being financed entirely by debt. In the long run the firm would need to raise some equity to balance the debt finance and the cost of the overall pool of funds should be considered, not the costs of individual sources of finance.

The weightings should be based on the long-run proportions in which future funds are to be raised. This is often estimated from the past proportions in which funds were raised. This approach should be adopted unless there is good evidence that the future mix will change.

If it is known that the future financing mix is to change, the calculations should be based on these new proportions. It should also be noted that if proportions of debt and equity change, their costs could also alter, as will be discussed in the next chapter.

3.4 Market or book weights

If the past proportions in which funds were raised are used, their weights may be measured by reference to book values or market values. Book weights normally give a lower cost as the proportion of equity is much smaller, since the value of equity in the balance sheet (nominal or par value plus retained earnings, share premium account, etc) owes much to history, eg when the shares were issued originally and at what price, rather than to the *current* value of those shares. Market weights are far more meaningful.

Whenever possible calculations should be based on market weights which represent the opportunity cost of finance (at what value it could be redeemed, or the value at which new funds could be raised).

Note that when using market values, reserves (such as share premium and retained earnings) are ignored. They are in effect incorporated in the value of the equity.

3.5 Procedure for calculating WACC

The company's weighted average cost of capital, k, is defined as follows:

$$k = \frac{(MV_e \times k_e) + (MV_d \times k_d)}{MV_e + MV_d}$$

Where MV_e = total market value of all the equity

MV_d = total market value of all the debt

That is, the individual costs of equity and debt capital are taken and each is weighted by the proportion of its market value to the company's total market value.

Worked example: Finding the WACC

Thus, given the following data about a company:

MV_e = CU500,000

k_e = 0.20

MV_d = CU500,000

k_d = 0.10

Requirement

What is the WACC?

Solution

Substituting this data into the expression for the WACC:

$$k = \frac{(\text{CU}500{,}000 \times 0.20) + (\text{CU}500{,}000 \times 0.10)}{\text{CU}(500{,}000 + 500{,}000)} = 0.15$$

15% is the discount rate to be used in the company's investment appraisal.

This formula can be extended to incorporate other forms of long-term finance, such as preference shares or bank loans.

Interactive question 10: Calculating WACC

[Difficulty level: Easy]

The market value of the debt is CU1m and its cost is 6%.

The market value of the equity is CU2m and its cost is 15%.

Requirement

Calculate the WACC.

See **Answer** at the end of this chapter.

3.6 When to use the weighted average cost of capital

The weighted average cost of capital calculated in the above example is based on the firm's current costs of equity and debt. In using it to appraise projects, the following assumptions are implicitly made:

- **The historical proportions of debt and equity are not to be changed**

  The cost of equity and debt based on current market information reflects the firm's current gearing ratio. If the firm substantially changes the long-run proportions in which funds are raised, then the costs of equity and debt are likely to change with a resulting alteration in the combined cost of capital. This changing of the company's so-called financial risk is the subject of the next chapter.

- **The systematic business risk of the firm is not to be changed**

  The firm's current costs of equity and debt also reflect the risks in its current area of operations. For example, high-risk electronics companies are likely to have higher costs of funds than, say, low risk food manufacturers. If a food manufacturing company were to diversify into electronics, its costs of finance would change. Current estimates of the cost of capital are therefore only suitable for appraising investments of similar systematic business risk. CAPM could be used to derive the cost of equity where the risk of the project is different from existing activities.

- **The finance is not project specific**

  In some circumstances it is unwise to use the average cost of a pool of funds. Suppose a government offered a multinational company an interest-free loan to encourage it to invest in a particular country. In this situation it would be unwise to put the cheap loan into the pool of funds and spread its benefit over all projects, as it is associated with only one specific project. In these circumstances the benefits of the cheap finance would need to be credited to the project. Fortunately this problem is outside the syllabus.

3.7 Other problems with the weighted average cost of capital

- **Which sources of finance to include**

  The above examples have concentrated on the cost of long-term finance. Firms also raise finance from short-term sources, eg overdrafts, short-term loans, trade credit and so on. It is possible to calculate a cost for short-term finance and it needs to be decided whether it should be included in the calculations.

  The usual argument is that the weighted average cost of capital is a tool for appraising long-term investments and, as these should only be financed by long-term funds, the costs of short-term funds should be excluded. However, if it is clear that short-term finance is being used to fund long-term projects, then it should be included.

- **Loans without market values**

  Bank loans do not have market values in the same way as debentures. The most practical approach in this case is to take the book value of loans as an approximation to market value.

- **Cost of capital for small companies**

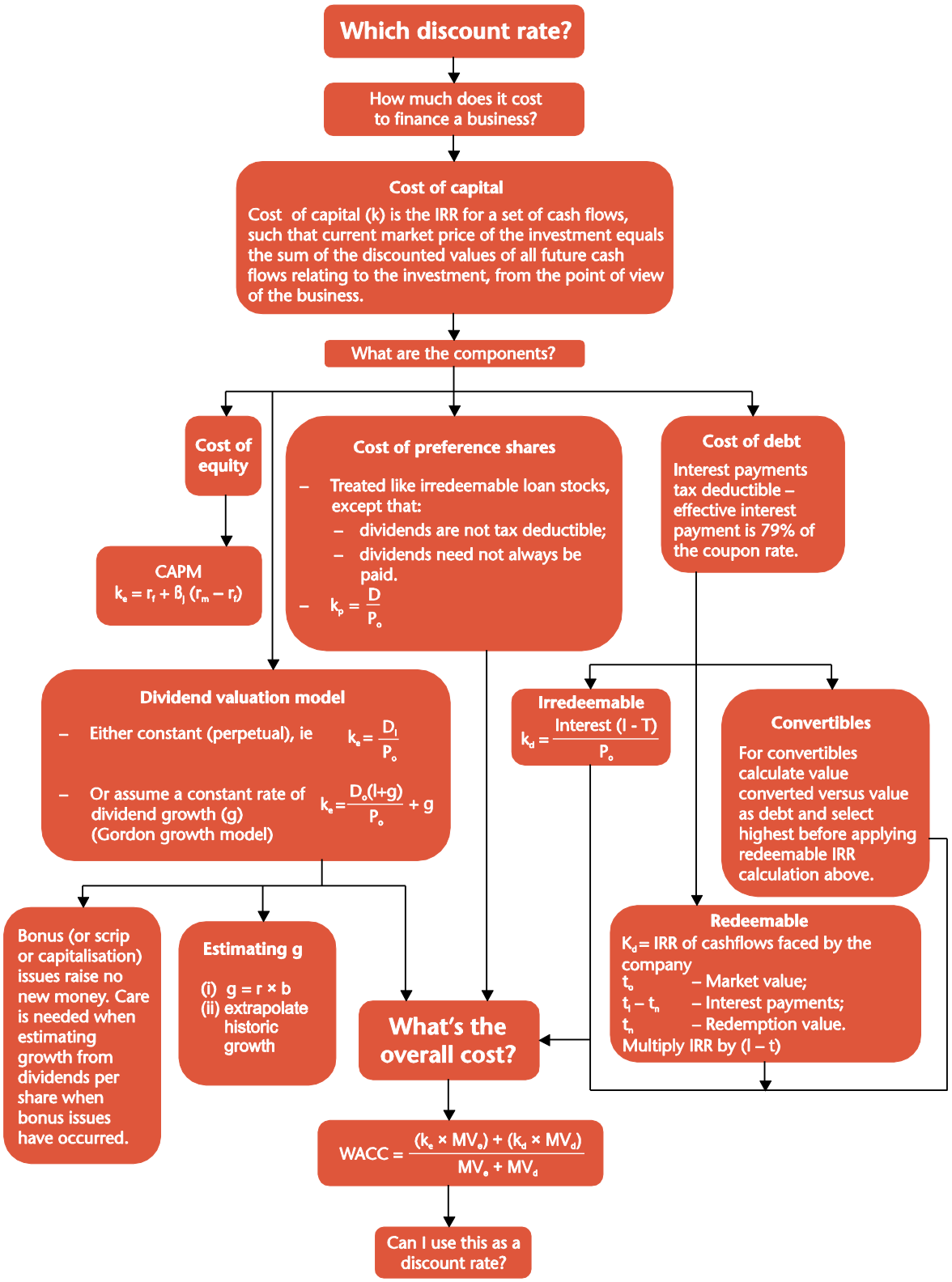
  There are important factors relevant to the cost of capital of small companies:

  – If the company is unquoted, obtaining the cost of finance is much more difficult

  – The lack of liquidity offered by the company's securities, plus the smaller size of the company, tend to make finance more expensive.

Summary and Self-test

Summary



Self-test

Answer the following questions.

1 An all-equity financed company distributes 80% of its earnings each year and reinvests the balance. The return on its projects is a constant 15% per annum.

If the company's current market capitalisation is CU1.5 million and its earnings are CU125,000, what is the required rate of return for the ordinary shareholder?

2 The following data relates to an all-equity financed company:

Dividend just paid	CU180,000
Earnings retained and invested	40%
Return on investments	15%
Cost of equity	20%

What is the market value (to the nearest CU000)?

3 An investment analyst expects a company, which has a history of constant annual dividend growth of 10%, to pay in one year's time a dividend of 10p per share and to have in one year's time a cum-div share price of CU1.20. Its annual cost of equity capital is 20%.

What would be the current cum-div share price (to the nearest penny) using the dividend growth model?

4 The dividends paid by Drood Ltd over the past four years are as follows:

Year	*20X4*	*20X5*	*20X6*	*20X7*
	CUm	CUm	CUm	CUm
Dividend	50	54	61	68

The company had 200 million issued shares entitled to dividends in 20X4 but made a scrip issue of 1 : 2 in January 20X7. The ex-div price per share on 1 January 20X8 is CU4.50.

What is the expected return on the shares?

5 The price of a company's shares is currently CU40 ex-div. The latest dividend is CU3 per share.

If the company's cost of equity is 10% per annum, what is the implicit constant annual dividend growth rate?

6 A company has just declared a dividend of 39.25p per share. Previous dividends have been as follows:

Four years ago	30.00p
Three years ago	32.40p
Two years ago	34.50p
One year ago	36.50p

The current ex-dividend market value per share is 831p.

What is the estimated cost of equity capital?

7 The summarised income statement for a company for the last year is as follows:

	CUm
Profit before taxation	100
Taxation	(40)
Profit after taxation	60
Dividends on ordinary shares	(40)

Retained earnings	20

Shareholders' equity of CU556 million is shown in the balance sheet at the beginning of the year. The company maintains a ratio of retained earnings to dividends of 1 : 2.

Using the earnings retention model, what is the dividend growth rate?

8 Corbet Ltd has just paid a dividend of CU1.20 per share. The last accounts show that its earnings per share were CU2.50 and that the value of its assets was CU6 million. There are 500,000 shares in issue currently quoted at CU8 ex-div.

What is the cost of capital of Corbet Ltd?

9 Four years ago a company paid a dividend of CU610,000 on a share capital of 4 million ordinary shares of 50p. It has just paid a dividend of CU960,000 on the same share capital, and the current market price of the shares is 300p.

What is the estimated cost of equity capital?

10 The ordinary dividend growth rates of Little Ltd, on an annual basis, for the past ten calendar years have been as follows:

Years	*Dividend growth rate*
20X0 to 20X4	5.0%
20X5	26.7%
20X6 to 20X9	10.0%

The ordinary shares have been listed since January 20X5.

What is the appropriate dividend growth rate to use when estimating the cost of equity capital at 31 December 20X9?

11 Quinton Ltd maintains a ratio of retained earnings to dividends of 1 : 3. Its summarised income statement for the year ended 31 December 20X5 was as follows:

	CU'000
Profit before tax	500
Taxation	(100)
	400
Dividends on ordinary shares	(300)
Retained earnings	100

The shareholders' equity is CU4,500,000.

What is the dividend growth rate per annum computed via the earnings retention model?

12 A company is issuing a ten year 7% redeemable debenture at par in a market where similar securities are yielding 10% per annum.

What is the minimum redemption premium (to the nearest CU) on CU100 of debt that the company must offer? (Assume debenture interest is payable annually.)

13 A company issued its 10% irredeemable debentures at 95. The current market price is 90. The company is paying corporation tax at a rate of 21%.

What is the current post-tax cost of capital per annum of these debentures?

14 A company has 15% debentures of CU100 nominal value. Investors require a gross yield of 12% on such debenture stock.

If the corporation tax rate is 21%, what is the post-tax cost of the debentures to the company?

15 Norley Ltd's irredeemable preference shares have a coupon rate of 8% and pay a dividend of CU4 per CU100 nominal value on 1 January and 1 July each year.

If the cum-dividend price on 1 January is CU86, what is the annual cost of the preference share capital to the company?

16 A company's 6% irredeemable preference shares of CU1 each have a market price of 65p. The company is paying corporation tax at a rate of 21%.

What is the cost of preference share capital?

17 Oldcourt Ltd's capital structure is as follows:

	CUm

CU1 ordinary shares	12
8% CU1 preference shares	6
12.5% loan stock 20X2	8
	26

The loan stock is redeemable at par in 20X2. The current market prices of the company's securities are as follows:

CU1 ordinary shares	225p
8% CU1 preference shares	92p
12.5% loan stock 20X2	CU100

The company is paying corporation tax at the rate of 21%. The cost of the company's ordinary equity capital has been estimated at 15% per annum.

What is the company's weighted average cost of capital for capital investment appraisal purposes?

18 A company's capital structure is as follows:

	CUm
10 million CU1 ordinary shares	10
Reserves	4
13% loan stock 20X4	7
	21

The loan stock is redeemable at par in 20X4. Current market prices for the company's securities are as follows:

CU1 ordinary shares	280p
13% loan stock 20X4	CU100

The company is paying corporation tax at a rate of 21%. The cost of the company's equity capital has been estimated at 12% per annum.

What is the company's per annum weighted average cost of capital for capital investment appraisal purposes?

19 Earnings and interest payments for the following firm are constant in perpetuity. All prices are ex-dividend or ex-interest with payments made annually. The firm has 100 million shares issued and fully paid at a nominal value of 25p and a market price of 120p. The dividends per share are 24p. The issued debt consists of CU160 million (nominal value) of irredeemable loans with a coupon rate of 6%. The debt is currently traded at CU50 per CU100 nominal. The rate of corporation tax is 21%.

What is the firm's post-tax weighted average cost of capital?

20 Portrush Ltd's capital structure is as follows:

	CUm
15 million CU1 ordinary shares	15
Reserves	8
12% debentures 20X0	6
	29

The debentures are redeemable at par in 20X0. The current market prices for the company's securities are as follows:

CU1 ordinary shares	160p
12% debentures 20X0	CU100

The company is paying corporation tax at the rate of 21%. The cost of the company's equity capital has been estimated at 16% per annum.

What is the company's weighted average cost of capital for capital investment appraisal purposes?

21 Bryan Ltd has 10 million 25p ordinary shares in issue with a current price of 155p cum-div. An annual dividend of 9p has been proposed. The company has adopted a policy of no interim dividend payments for some years and those annual dividends have been growing at a steady rate of 6% per annum. The company's other major source of funds is a bank loan of CU7 million which has an annual cost of 13%.

If Bryan Ltd pays corporation tax at a rate of 21%, what is its post-tax weighted average cost of capital?

22 A company is considering an investment which will require an initial outlay of CU300,000 and will produce cash inflows of CU125,000 in perpetuity. Other details are as follows:

Authorised share capital 10 million 25p shares

Issued share capital 5 million	25p shares
Current market price per share (cum-div)	CU1.25
Normal annual dividend	25p

If the company accepts the project and finances it by reducing the forthcoming dividend, what will be the new (cum-div) share price, assuming that the shareholders have perfect knowledge about the project?

23 (a) STOCK LTD

Stock Ltd has demonstrated a constant growth in dividends of 4% for several years. One year ago the dividend was 25p per share and the most recent dividend is due to be paid shortly. The shares have a nominal value of CU1.00 and a market value of CU1.98 cum-div.

Requirement

What is the cost of equity capital?

(b) **Nails Ltd**

The following represents a five-year summary of the results of Nails Ltd.

	20Y2 CUm	20Y1 CUm	20Y0 CUm	20X9 CUm	20X8 CUm
Net assets	1,585	1,486	1,390	1,301	1,223
Share capital	560	560	560	560	560
Share premium	280	280	280	280	280
Retained earnings	745	646	550	461	383
	1,585	1,486	1,390	1,301	1,223
Profit after tax	124	118	111	98	92
Dividend	25	22	22	20	19
Profit retained	99	96	89	78	73

The share capital is made up entirely of CU1 ordinary shares. The share price is currently quoted at 61p ex-div.

Requirement

Calculate the cost of equity capital for Nails Ltd.

(c) **Equity cost of capital**

A company's profit after tax for the year just ended is CU282,000. Out of this a dividend of CU95,880 will be paid. At the close of the year shareholders' funds total CU3,711,120. Equity capital consists of 426,000 CU1 ordinary shares each valued at CU1.475 cum-div.

Requirement

What is the cost of equity capital?

(d) **Equity capital**

A company's dividend history is as detailed below.

	CUm
20X6	19.2
20X7	19.9
20X8	20.6
20X9	21.3
20Y0	21.9
20Y1 (just paid)	22.7

The company has 336 million CU1 ordinary shares valued at par.

Requirement

Calculate the cost of equity capital.

(e) **Delta Ltd**

Delta Ltd has paid the following dividends over recent years.

	CU
20X8	520,000
20X9	551,000
20Y0	584,300
20Y1	100,000

20Y2	619,300

The current market capitalisation is CU6,587,100. This includes the 20Y2 dividend due to be paid shortly.

Requirement

What is the cost of capital for this all-equity financed company?

(f) **Oz Ltd**

Oz Ltd's dividends in recent years can be summarised as follows.

	CU'000
20W9	860
20X0	1,020
20X1	610
20X2	670
20X3	738
20X4	813
20X5	895
20X6	980
20X7	1,082
20X8	1,190
20X9	474
20Y0	2,100

Current market capitalisation of equity is CU22.63m, the 20Y0 dividend having been paid recently. The dividends paid in 20X9 and 20Y0 were wholly uncharacteristic and it is widely believed that the former trends in dividends will be re-established in 20Y1.

Requirement

Estimate the cost of equity capital.

(g) **Debt capital**

A company's capital structure includes 50m 8% irredeemable debentures valued at CU85%. Corporation tax is charged at 21%.

Requirement

Calculate the post-tax cost of debt capital.

(h) **Corporation tax**

A company has in issue 20 million 7.5% irredeemable debentures. Debt investors currently demand a return of 6%. Interest is paid annually and the last payment was made several weeks ago. Corporation tax is 21%.

Requirement

Calculate the post-tax cost of debt to the company.

(i) **Debentures**

A company has in issue CU20 million 7% debentures redeemable at par in eight years' time. Interest is paid annually and qualifies for immediate tax relief at 21%. Investors require a return of 10%.

Requirement

Estimate the post-tax cost of debt capital.

(j) **Convertible debt**

A company has in issue 6% convertible debentures. Interest is paid annually and is eligible for immediate tax relief at 21%. On the conversion date in two years' time, investors can choose between CU100 cash or ordinary shares valued at CU95 in return for every CU100 (nominal) of debentures. These investors demand a return of 5%.

Requirement

Calculate the cost of this convertible debt to the company.

24 FIZZERS LTD

Fizzers Ltd is a listed Bangladeshi company which makes a range of soft drinks, over 90% of which are sold in Bangladesh market. The company currently has a cash surplus, and the directors are contemplating a major investment in a plant in the Middle East to supply the local market. The Middle East market, important for the company, is currently supplied from Bangladesh.

To assess the economic viability of the investment, the finance department needs a rate at which to discount the projected cash flows from the plant. It has been decided to use the company's weighted average cost of capital (WACC), deducing the cost of equity through the dividend growth model.

The company's most recent balance sheet, dated 31 August 20X9, included the following 'capital and reserves' section.

	CU'000
Called up share capital (ordinary shares of CU0.10 each, fully paid)	5,750
Retained earnings	29,750

The company also had in issue CU100 million of 9% loan stock. This is to be redeemed on 1 September 20Y0 at par. Interest is payable (in arrears) on 1 September each year. It has been the company's practice to pay a single dividend each year during September.

Dividends paid per share over recent years have been as follows.

	Pence
20X4	21.25
20X5	22.50
20X6	22.50
20X7	24.50
20X8	25.00

The 20X9 dividend will be 25.50 pence per share. The company's issued and fully paid share capital has not altered since 20X3.

At 31 August 20X9 the shares were quoted at CU3.35 per share (cum-div) and the loan stock at CU101.72 (cum-interest) per CU100 nominal.

The corporation tax rate is expected to remain at 21% for the foreseeable future.

Requirements

(a) Determine the company's weighted average cost of capital, explaining your workings and justifying any assumptions which you have made. **(9 marks)**

(b) Explain why the figure which you have determined in (a) may not be totally reliable for the purpose for which it has been determined. **(5 marks)**

(c) As an alternative to investing in the Middle Eastern plant the directors are considering a takeover bid for Zoom Ltd., another soft drinks manufacturer.

Set out the advantages and disadvantages of the following three types of bid.

(i) Cash
(ii) Share-for-share exchange
(iii) Loan stock for share exchange. **(6 marks)**

(20 marks)

25 THAMOS LTD

Thamos Ltd is a successful food retailing company. Over the last five years it has increased its share of Bangladesh food retail market by 30%. It makes no use of debt and has financed its operations entirely from retained earnings. Thamos Ltd has a current price/earnings ratio of 28 compared with the food retailing sector average of 19. Other financial data relating to the company are shown below.

	20X2	*20X3*	*20X4*	*20X5*	*20X6*
	p	*p*	*p*	*p*	*p*
Earnings per share	16.10	19.30	24.70	30.50	35.80
Net dividend per share	4.86	5.86	7.50	9.00	11.00
Book value of equity per share	103.00	124.00	142.00	165.00	190.00

Requirements

(a) Estimate the cost of equity capital for Thamos Ltd using the following.

(i) Dividend growth model

(ii) Earnings retention model. **(6 marks)**

(b) Discuss whether the assumptions underlying the models used in part (a) are realistic, and explain how the effects of using these assumptions are reflected in the results obtained. **(6 marks)**

(c) Explain why managers need to know the cost of the equity capital of their companies. **(6 marks)**

(18 marks)

26 OSMIN LTD

The directors of Osmin Ltd are considering opening a factory to manufacture a new product. Detailed forecasts of the product's expected cash flows have been made, and it is estimated that an initial capital investment of CU2.5 million is required. The company's current (31 December 20X1) authorised share capital consists of 4 million ordinary shares, each with a nominal value of 25p. During the last five years the number of shares in issue has remained constant at 3 million, and the market price per share at 31 December 20X1 is 135p ex-dividend.

The company pays only one dividend each year (on 31 December) and dividends for the last five years have been as follows.

Year	*20W7*	*20W8*	*20W9*	*20X0*	*20X1*
Dividend per share (pence)	10.0	10.8	11.6	13.6	13.6

Osmin Ltd currently has in issue CU800,000 8% debentures redeemable at par on 31 December 20X5. The current market price of these debentures is CU82.50 ex-interest, and the interest is payable in one amount each year on 31 December. The company also has outstanding a CU900,000 bank loan repayable on 31 December 20X9. The rate of interest on this loan is variable, being fixed at 1.5% above the bank's base rate which is currently 15%.

Requirements

(a) Calculate the weighted average cost of capital (WACC) for Osmin Ltd as at 31 December 20X1. **(6 marks)**

(b) Explain briefly to the directors of Osmin Ltd what assumptions they are making if the WACC calculation in (a) above is used to discount the expected cash flows of the project. **(6 marks)**

(c) Describe the practical problems that might be encountered when attempting to compute the WACC for a large Bangladeshi listed company. **(8 marks)**

Note. Ignore taxation. **(20 marks)**

27 CROWLANDS LTD

Crowlands Ltd is a listed manufacturing company financed by a mixture of debt and equity. The company's finance department is about to undertake its annual revision of the weighted average cost of capital (WACC) for use in all of the company's investment appraisals for the forthcoming year. The following information on the company's long-term financing was available as at 31 May 20X1.

	CUm
220 million ordinary shares of 25 pence each	55

Share premium	23
Revaluation reserve	26
Retained earnings	33
12% loan stock (20X3)	100

The loan stock interest for the year has just been paid. Interest on this loan will be paid on 31 May 20X2 and 20X3. On the latter date the loan stock will be redeemed at par in cash. The company has also just paid a dividend on its ordinary shares of 23 pence. This was the total dividend for the year. Dividends have grown by an average annual rate of 5% over recent years, but year-to-year growth has been as high as 10% and as low as 2% during individual years.

The shares are currently quoted at 370 pence each, and the loan stock at CU104 (per CU100 nominal). The company's corporation tax rate is 21%.

Several of the directors believe that the company is relatively low-geared and there is talk of making a substantial loan stock issue during the forthcoming year.

Requirements

(a) Determine the company's WACC, ignoring any possibility of a further loan stock issue. All of your workings should be clearly explained and you should justify the weightings used. **(6 marks)**

(b) Explain any reservations you might have about using the figure determined in (a) for assessing all potential projects during the forthcoming year, still ignoring any possibility of the loan stock issue. **(6 marks)**

(c) Explain how, in theory and in practice, a possible loan stock issue would affect the validity of the WACC determined in (a). **(5 marks)**

(17 marks)

28 REDSKINS LTD

Redskins Ltd is a holding company owning shares in various subsidiary companies. Its directors are currently considering several projects to increase the range of the business activities undertaken by Redskins Ltd and its subsidiaries. The directors would like to use DCF techniques in their evaluation of these projects but as yet no weighted average cost of capital has been calculated.

Redskins Ltd has an authorised share capital of 10 million 25p ordinary shares, of which 8 million have been issued. The current *ex-dividend* market price per ordinary share is CU1.10. A dividend of 10p per share has been paid recently. The company's project analyst has calculated that 18% is the most appropriate after-tax cost of equity capital.

Capital structure information for both the group and the holding company are given below.

	Redskins Ltd and subsidiaries CU'000	Redskins Ltd CU'000
Issued share capital	2,000	2,000
Share premium	1,960	1,960
Reserves	3,745	708
Shareholders' funds	7,705	4,668
Non-controlling interests	895	Nil
3% irredeemable debentures	1,400	–
9% redeemable debentures	1,500	1,500
6% loan stock	2,000	2,000
Bank loans	1,540	600

All debt interest is payable annually and all the current year's payments will be made shortly. The current *cum-interest* market prices for CU100 nominal value stock are CU31.60 and CU103.26 for the 3% and 9% debentures respectively. Both the 9% debentures and the 6% loan stock are redeemable at par in ten years' time. The 6% loan stock is not traded on the open market but the analyst estimates that its actual pre-tax cost is 10% per annum. The bank loans bear interest at 2% above base rate (which is currently 11%) and are repayable in six years. The effective corporation tax rate of Redskins Ltd is 21%.

Requirements

(a) Calculate the effective after-tax weighted average cost of capital as required by the directors. **(8 marks)**

(b) Discuss the problems that are encountered in the estimation of a company's weighted average cost of capital when

(i) bank overdrafts
(ii) convertible loan stock

are used as sources of long-term finance. **(6 marks)**

(c) Outline the fundamental assumptions that are made whenever the weighted average cost of capital of a company is used as the discount rate in net present value calculations. **(6 marks)**

Note. Ignore personal taxation. **(20 marks)**

29 GALE LTD

Gale Ltd (Gale) is an information technology services company listed on the London Stock Exchange which is looking to expand its operations into the provision of self-service point-of-sale systems for supermarkets across Europe. The company has grown rapidly in recent years with annual dividends having seen consistent growth as follows:

20X5	*20X6*	*20X7*	*20X8*	*20X9*
10.00p	12.00p	13.50p	14.50p	15.75p

The company expects dividends to continue to grow for the foreseeable future in line with this recent dividend profile. Extracts from the company's most recent balance sheet at 31 May 20X9 are set out below:

	CU'000	CU'000
Ordinary CU1 shares	14,000	
5.5% CU1 irredeemable preference shares	10,000	
Retained earnings	19,400	
Total equity		43,400
7% irredeemable debentures (at nominal value)	50,000	
6% unsecured loan notes (at nominal value)	36,000	
Total non-current liabilities		86,000

The current ex-dividend ordinary share price is CU3.50, whilst the current ex-dividend preference share price is CU0.77. The irredeemable debentures have a current ex-interest market price of CU86.50 per CU100 debenture, whilst the unsecured loan notes have a current ex-interest market price of CU84 per CU100 loan note and will be redeemable at par in seven years' time. The company pays corporation tax at a rate of 21%. The company's current liabilities do not include any overdraft borrowing.

Regarding the company's proposed expansion plans, the chief executive has expressed his preference for any financing requirements to come from increasing debt rather than increasing equity in order to move towards minimising the company's weighted average cost of capital.

Requirements

(a) From the available information calculate, using market values, the company's weighted average cost of capital. **(10 marks)**

(b) Explain the challenges that Gale would face in trying to calculate its weighted average cost of capital if overdraft borrowing was a permanent feature of the company's current liabilities and discuss how these challenges might be addressed in practice.

(3 marks)

(c) Discuss the preference of the chief executive for any financing requirements to come from increasing debt rather than increasing equity in order to move towards minimising the company's weighted average cost of capital. **(8 marks)**

(21 marks)

Now go back to the Learning Objectives in the Introduction. If you are satisfied you have achieved those objectives, please tick them off.

Answers to Interactive questions

Answer to Interactive question 1

(a) $k_e = \frac{D_0}{P_0} = \frac{0.5}{2.5} = 0.2$ or 20%

(b) $k_e = \frac{D_0(1+g)}{P_0} + g = \frac{0.5 \times 1.1}{2.5} + 0.1 = 0.32$ or 32%

(c) $P_0 = \frac{D_0}{K_e} = \frac{CU0.3}{0.15} = CU2$

(d) $P_0 = \frac{D_0(1+g)}{K_e - g} = \frac{£0.3 \times 1.05}{0.15 - 0.05} = CU3.15$

Answer to Interactive question 2

MV (cum div) = CU2.20

MV (ex div) = CU2.00

$k_e = \frac{D_0}{P_0} = \frac{20}{200} \times 100\% = 10\%$

Answer to Interactive question 3

$k_e = \frac{0.12(1.05)}{1.75} + 0.05 = 12.2\%$

Answer to Interactive question 4

Data is available for the four years to 20X4, so:

$100(1 + g)^4 = 145$

$(1 + g)^4 = \frac{145}{100}$

$1 + g = \sqrt[4]{\frac{145}{100}} = 1.097$

Thus compound growth, g = 9.7%

The cost of equity is $k_e = \frac{D_0(1+g)}{P_0} + g = \frac{145\,(1.097)}{1{,}050} + 0.097 = 24.8\%$

Answer to Interactive question 5

Growth rate: g = r × b where:

(i) b = % profit retained = $\frac{\text{CU25,000}}{\text{CU75,000}}$ = 33%

(ii) r = return on investment = $\frac{\text{profit after tax}}{\text{opening net assets}}$

= $\frac{\text{CU75,000}}{\text{CU1,060,000-CU25,000}}$ × 100% = 7.2%

(iii) g = 0.33 × 0.072 = 0.024 = 2.4%

Thus $k_e = \frac{D_0(1+g)}{P_0}$ + g, the cost of equity is $\frac{\text{CU50,000(1.024)}}{\text{300,000XCU1.35}}$ + 0.024 = 15.0%

Answer to Interactive question 6

12% preference shares: dividend is 12% × nominal value

$k_p = \frac{D_0}{P_0} = \frac{\text{cu}12}{\text{cu}115} \times 100\% = 10.4\%$

Answer to Interactive question 7

Using r = $\frac{\text{Interest}}{D} = \frac{\text{CU}12}{\text{CU}92 - \text{CU}2} \times 100\% = 15\%$

Thus return required by debenture holders is 15%.

The cost to the company is calculated by reference to the ex-interest market price, so:

$k_d = \frac{\text{Interest}\ (1-T)}{D} = \frac{\text{cu}12(1-0.21)}{\text{cu}92 - £12} = 11.9\%$

Answer to Interactive question 8

Using trial and error

	CU	DF @ 5%	PV CU	DF @ 10%	PV CU
t0	(98)	1	(98.00)	1	(98.00)
t1 – t5	10	4.329	43.29	3.791	37.91
t5	105	0.784	82.32	0.621	65.21
			27.61		5.12

IRR = $5 + \frac{27.61}{27.61-5.12}$ (10 – 5) = 11.14%

Post-tax cost of debt = 11.14 × (1 – 0.21) = 8.8%

Answer to Interactive question 9

Firstly we need to decide whether or not the loan stock will be converted in five years.

To do this we compare the expected value of 40 shares in five years' time with the cash alternative.

We assume that the MV of shares will grow at the same rate as the dividends.

MV/share in five years = $2(1.07)^5$ = CU2.81

Therefore MV of 40 shares = CU112.40

Cash alternative = CU105

Therefore all loan stockholders will choose the share conversion.

To find the cost to the company, calculate the IRR of the cash flows.

	CU	DF @ 5%	PV CU	DF @ 10%	PV CU
T0	(85)	1	(85.00)	1	(85.00)
T1-5	8	4.329	34.63	3.791	30.33
T5	112.4	0.784	88.12	0.621	69.80
			37.75		15.13

$$\text{IRR} = 5 + \frac{37.75}{37.75 - 15.13} \times (10 - 5) = 13.34\%$$

Therefore the post-tax cost to the company = $13.34 \times (1 - 0.21) = 10.54\%$.

Answer to Interactive question 10

$$\text{WACC} = \frac{(£2\text{m} \times 15\%) + (^{cu}1\text{m} \times 6\%)}{^{cu}2\text{m} + ^{cu}1\text{m}} = 12\%$$

Answers to Self-test

1 $k_e = \frac{D_0(1+g)}{P_0} + g$

$g = b \times r$
$= 0.2 \times 0.15$

$D_0 = 0.8 \times CU125{,}000$

$k_e = \frac{125 \times 0.8 \times (1 + 0.15 \times 0.2)}{1{,}500} + 0.15 \times 0.2$

$= 9.9\%$

2 $P_0 = \frac{D_0(1+g)}{k_e - g}$

$g = rb$
$= 0.4 \times 15\%$
$= 6\%$

$P_0 = \frac{CU180{,}000 \times 1.06}{0.2 - 0.06}$

$= CU1{,}362{,}857$

3 Current ex-div price = Cum-div price in one year's time $\times \frac{1}{(1+k_e)}$

$= CU1.20 \times \frac{1}{1.2}$

$= 100p$

Current dividend $= 10p \times \frac{1}{(1+g)}$

$= 9p$

Current cum-div price = 109p

4 $k_e = \frac{D_0(1+g)}{P_0} + g$

Where there has been a scrip issue the dividends per share in the calculations must be adjusted.

Dividend per share	20X4	$\frac{50}{300}$	= 16.67p
	20X7	$\frac{68}{300}$	= 22.67p
		22.67	$= 16.67 \times (1+g)^3$
		g	$= \sqrt[3]{\frac{22.67}{16.67}} - 1$
			= 10.8%
		k_e	$= \frac{22.67}{450} \times (1.108) + 0.108$
			= 16.4%

5 $k_e = \frac{D_0(1+g)}{P_0} + g$

CHAPTER 5

$$10\% = \frac{3(1+g)}{40} + g$$

$$g = \frac{4-3}{43}$$

$$= 2.33\%$$

6 $$g = \sqrt[4]{\frac{39.25}{30.00}} - 1$$

$$= 6.95\%$$

$$k_e = \frac{D_0(1+g)}{P_0} + g$$

$$= \frac{39.25 \times 1.0695}{831} + 0.0695$$

$$= 12\%$$

7 g = br where b is the retention rate and r is the return on reinvested funds

$$= \frac{1}{3} \times \frac{60}{556}$$

$$= 3.6\%$$

8 $$k_e = \frac{D_0(1+g)}{P_0} + g$$

g = br, where b is the retention rate and r is the return on reinvested funds. Opening net assets cannot be calculated, therefore using closing net assets to calculate r.

$$= \frac{2.50 - 1.20}{2.50} \times \frac{2.50 \times 500{,}000}{6{,}000{,}000}$$

$$= 10.8\%$$

$$k_e = \frac{1.20 \times 1.108}{8} + 0.108$$

$$= 27.42\%$$

9 $$g = \sqrt[4]{960 \div 610} - 1$$

$$= 12\%$$

$$k_e = \frac{D_0(1+g)}{P_0} + g$$

$$= \frac{960 \times 1.12}{4{,}000 \times 3} + 0.12$$

$$= 20.96\%$$

$$= 21.0\% \text{ rounded}$$

10 The growth rate should reflect the trend in dividend payments likely to continue into the future. Therefore the most appropriate rate = 10%.

11 g = br where b is the retention rate and r is the return on reinvested funds. Opening net assets cannot be calculated, therefore using closing net assets to calculate r

$$g = \frac{1}{4} \times \frac{400}{4{,}500}$$

= 2.22%

12

Time		*DF @10%*	*PV*
	CU		CU
0	(100)	1	(100)
1–10	7	6.145	43.015
10	x	0.386	0.386x

To give a 10% return, 43.015 + 0.386x = 100, ie x = CU147.63, so the premium is CU(147.63 – 100) = CU47.63.

13 $k_d = \frac{\text{Interest}\ (1-T)}{D}$

$= \frac{10 \times (1-0.21)}{90}$

= 8.8%

14 MV $= \frac{£15}{0.12}$

= CU125, based on gross yield and gross interest

Therefore cost to company $= \frac{^{cu}15 \times 0.79}{^{cu}125}$

= 0.0948 or 9.48%

Alternative solution:

Assuming irredeemable debt, the cost to the company = return required by investors less tax shield on interest, ie r × (1 – t) = 12% × (1 – 0.21) = 9.48%

15 k_p (six months) $= \frac{4}{82}$

= 4.878%

k_p (per annum) $= 1.04878^2 - 1$

= 9.99%

16 Cost of preference share capital $= \frac{0.06}{0.65}$

= 9.2%

17 $k = \frac{0.15 \times (12 \times 2.25) + (8/92) \times (6 \times 0.92) + 0.125 \times (1-0.21) \times 8}{(12 \times 2.25) + (6 \times 0.92) + 8}$

= 13.13%

18 k_d = Coupon rate × (1 – T) for redeemable debt standing at par in the market and redeemable at par, ie

k_d = 13% × (1 – 0.21)

= 10.27%

k_e = 12%

k = $(Ek_e + Dk_d)/(E + D)$

$= (10m \times CU2.80 \times 12\% + CU7m \times 10.27\%) / (10m \times CU2.80 + 7m)$

$= 11.65\%$

19 $k_e = \frac{D_0}{P_0}$

$= \frac{24}{120}$

$= 20\%$

$k_d = \frac{\text{Interest}\,(1-T)}{D}$

$= \frac{6 \times (1-0.21)}{50}$

$= 9.48\%$

$k = \frac{Ek_e + Dk_d}{E+D}$

$= \frac{100m \times \text{CU}1.20 \times 20\% + \text{CU}160m \times 0.5 \times 9.48\%}{100m \times \text{CU}1.20 + \text{CU}160m \times 0.5}$

$= 15.79\%$

20 k_d for redeemable debentures which are standing at par in the market and are redeemable at par, is equal to the coupon rate less corporation tax, ie

$k_d = 12\% \times (1 - 0.21)$

$= 9.48\%$

$k_e = 16\%$

$k = \frac{Ek_e + Dk_d}{E+D}$

$= \frac{15m \times \text{CU}1.60 \times 16\% + \text{CU}6m \times 9.48\%}{15m \times \text{CU}1.60 + \text{CU}6m}$

$= 14.70\%$

21 $D = \text{CU7 million}$

$E = 10 \text{ million} \times CU(1.55 - 0.09)$

$= \text{CU14.6 million}$

$k_d = 13\% \times 0.79$

$= 10.27\%$

$k_e = \frac{9 \times 1.06}{1.55 - 0.09} + 6$

$= 12.53\%$

k $= \dfrac{7 \times 10.27\% + 14.6 \times 12.53\%}{7 + 14.6}$

= 11.80%

22 Cost of capital $= \dfrac{25}{100}$

= 0.25

= 25%

Dividends per share $t_1 - \infty$ = 25p + $\dfrac{\text{CU}125{,}000}{5{,}000{,}000}$

= 27.5p

New ex-div value $= \dfrac{27.5\text{p}}{0.25}$

= CU1.10

New dividend per share t_0 = 25p – $\dfrac{\text{CU}300{,}000}{5{,}000{,}000}$

= 19p

Cum-div = CU1.29

23 (a) **Stock Ltd**

Dividend one year ago = 25p

Current dividend (D_0) = 1.04 × 25p

= 26p

Therefore current ex-div market value = CU(1.98 – 0.26)

= CU1.72

per dividend valuation model (Gordon growth model) $k_e = \dfrac{D_0(1+g)}{P_0} + g$

$= \dfrac{0.26 \times 1.04}{1.72} + 0.04$

= 0.197, ie 19.7%

(b) **Nails Ltd**

Estimate g using earnings retention model and most recent set of accounts

Opening shareholders' funds 20Y2 (CUm) = 1,585 – 99

= 1,486

(r) return on investments 20Y2 $= \dfrac{124}{1{,}486} \times 100\%$

= 8.34%

Profits retained 20Y2 $= \dfrac{99}{124} \times 100\%$

= 79.84%

Estimate of g = 0.0834 × 0.7984 × 100%

= 6.66%

per dividend valuation model (Gordon growth model), $k_e = \frac{D_0(1+g)}{P_0} + g$

$= \frac{25(1.0666)}{0.61 \times 560} + 0.0666$

$= \frac{26.665}{341.6} + 0.0666$

= 0.145, ie 14.5%

Note $(1 + g)^4 = \frac{25}{19}$ (per historic dividends)

ie $g = \sqrt[4]{\frac{25}{19}} - 1$

= 0.071

Therefore $k_e = \frac{25(1.071)}{341.6} + 0.071$

= 0.1494, ie 14.94%

(c) **Equity cost of capital**

Using earnings retention model

Retained earnings = CU(282,000 – 95,880)

= CU186,120

Estimate of r $= \frac{\text{PAT}}{\text{Opening shareholders' funds}}$

$= \frac{\text{CU}282,000}{\text{CU}(3,711,120 - 186,120)}$

= 0.08

Estimate of b $= \frac{\text{Retained earnings}}{\text{PAT}}$

$= \frac{\text{CU}186,120}{\text{CU}282,000}$

= 0.66

∴ Estimate of g = 0.08 × 0.66

= 0.0528

per dividend valuation model (Gordon growth model), $k_e = \frac{D_0(1+g)}{P_0} + g$

MV ex-div = (426,000 × CU1.475) – CU95,880

= CU532,470

$k_e = \frac{\text{CU}95,880 \times 1.0528}{\text{CU}532,470} + 0.0528$

= 0.242, ie 24.2%

(d) **Equity capital**

Using historical data

$(1 + g)^5 = \frac{22.7}{19.2}$

$\therefore (1 + g) = \sqrt[5]{\frac{22.7}{19.2}}$

$= 1.034$

$\therefore g = 3.4\%$

per dividend valuation model (Gordon growth model), $k_e = \frac{D_0(1+g)}{P_0} + g$

$= \frac{22.7(1.034)}{336} + 0.034$

$= 0.104$, ie 10.4%

(e) **Delta Ltd**

MV_{XD} = CU(6,587,100 – 619,300)

= CU5,967,800

To estimate g, assume that the growth rate has been constant in spite of 20Y1 looking odd.

$(1 + g)^4 = \frac{619,300}{520,000}$

$\therefore g = \sqrt[4]{\frac{619,300}{520,000}} - 1$

= 0.045, ie 4.5%

per dividend valuation model (Gordon growth model), $k_e = \frac{D_0(1+g)}{P_0} + g$

$= \frac{619,300(1.045)}{5,967,800} + 0.045$

= 0.153, ie 15.3%

(f) **Oz Ltd**

Need to estimate g from past dividends.

The trend can be established by considering the period from 20X1 to 20X8.

$\therefore$ Estimate of g is

$\sqrt[7]{\frac{1,190}{610}} - 1 = 0.10$

Per dividend valuation model (Gordon growth model)

$k_e = \frac{D_1}{P_0} + g$

To estimate D1 use the 20X8 dividend and apply three years of growth.

$\therefore D_1 = 1,190 \times 1.1^3$
$= 1,584$ (CU'000)

So $k_e = \frac{1,584}{22,630} + 0.1$

= 0.17, ie 17%

(g) **Debt capital**

Per CU100 block of debentures

Annual interest (gross) = CU8

Market value = CU85

$$\text{Cost of debt} = \frac{\text{Interest}\,(1-T_c)}{D}$$

$$= \frac{8 \times 0.79}{85}$$

= 0.0744, ie 7.44%

(h) **Corporation tax**

Per CU100 block of debentures

$$\text{Market value} = \frac{\text{Interest}}{\text{Required return}}$$

$$= \frac{\text{CU}7.50}{0.06}$$

= CU125

For the company

$$\text{Cost of debt} = \frac{\text{Interest}\,(1-T_c)}{\text{Market value}}$$

$$= \frac{\text{CU}7.50 \times 0.79}{\text{CU}125}$$

$$= \frac{\text{CU}5.925}{\text{CU}125}$$

= 0.0474, ie 4.74%

Note. For irredeemable debentures use the short-cut

Post-tax cost = (1 – T_c) × Pre-tax cost

ie Post-tax cost of debt = 0.79 × 0.06
= 0.0474, ie 4.74%

(i) **Debentures**

First, establish the market value (calculations based on a CU100 block of debentures).

Discount the flows received by an investor at the required rate of return.

Time	Flow	10% discount factor	Present value
	CU		CU
t1–8	7	5.335	37.35
t8	100	0.467	46.70
			84.05

∴ Market value of CU100 nominal = CU84.05

For the company, the pre-tax cost of debt is the IRR of pre-tax flows.

Time	*Flow*	*7% df*	*7% PV*	*10% df*	*10% PV*
	CU		CU		CU
t_0	84.05	1	84.05	1	84.05

t_{1-8}	(7.00)	5.971	(41.80)	5.335	(37.35)
t_8	(100.00)	0.582	(58.20)	0.467	(46.70)
			(15.95)		0.00

$\therefore$ IRR = 10

Post-tax cost of debt = $10 \times (1 - 0.21) = 7.9\%$

(j) **Convertible debt**

First find the current market value. To do so, we must decide what cash flow to include at the date of conversion. The share value (CU95) represents future cash flows discounted at the required rate of return. This is therefore not as attractive as the cash alternative of CU100. All rational investors will hence take the cash.

For the investors:

Time	Flow CU		5% df	5% PV CU
t1-2	6	interest	1.859	11.15
t2	100	cash	0.907	90.70
		market value =		101.85

(The above figures are based on a CU100 nominal block of debentures.)

For the cost of capital we must find the IRR of the cash flows for the company.

Time	*Flow*		*2% df*	*2% PV*	*3% df*	*3% PV*
	CU			CU		CU
t_0	(101.85)	MV	1	(101.85)	1	(101.85)
t_{1-2}	6	net interest	1.942	11.65	1.913	11.48
t_2	100	cash	0.961	96.10	0.943	94.30
				5.90		3.93

$$\therefore \text{IRR} = 2\% + \frac{5.90}{5.90 - 3.93}(3-2)\% = 4.99\%$$

Post-tax cost of debt = 4.99 × (1 – 0.21) = 3.9%

24 FIZZERS LTD

(a) **Cost of capital calculation**

Cost of equity (K_e)

Using the dividend valuation model (Gordon growth model), $K_e = \frac{D_0(1+g)}{P_0} + g$

Assuming that dividend growth over the last five years is a good indicator of shareholders' expectations regarding the future:

$$g = \left(\frac{25.5}{21.25}\right)^{1/5} - 1 = 3.71\%$$

$$\text{Thus } K_e = 25.5\left(\frac{1.0371}{335 - 25.5}\right) + 0.0371 = 12.25\%$$

MV of shares = 57,500 × 3.095 = CU177,962,500

Cost of debt (K_d)

The K_d will equal the IRR of the cash flows from the company's perspective.

The debt will be redeemed in one year, so it is possible to calculate the cost exactly.

Consider a bond with nominal value CU100.

Time	*Narrative*	*Cash flow*	*Discount factor*	*Present value*
0	MV (ex int)	92.72	1.000	92.72
1	R + Interest	(109.00)	0.851 (Bal)	(92.72)
	NPV			0.00

The t = 1 discount figure is $\frac{1}{(1+K_d)}$ which must equal 0.851 to give a NPV of zero.

$$\text{Thus } 1 + K_d = \frac{1}{0.851} = 1.1751, \text{ giving pre-tax } K_d = 17.51\%$$

Post-tax cost of debt = 17.51 × (1 – 0.21) = 13.83%

The MV of the debt = CU100 million × 92.72% = CU92,720,000 ex interest.

WACC

The WACC normally includes long-term finance only. In the case of Fizzers Ltd the debt is to be redeemed in one year's time. Thus the debt should only be included in the WACC if it is assumed that more debt will raised in the near future to replace it. (If not, then the WACC is the cost of equity of 12.25%.)

$$\text{WACC} = \frac{(12.25 \times 177.96 + 13.83 \times 92.72)}{270.68} = 12.79\%$$

The assumptions made above are justifiable for the following reasons.

- Past dividend growth has been reasonably steady, so it is likely that shareholders will expect similar in the future. It is their expectations that determine the share price. Growth of 2% in 20X8 and 20X9 might be a better estimate for future growth than the five year average.

- The company's existing gearing ratio (debt:equity) is approximately 1:2, which seems reasonable. Because debt has some advantages eg low costs of issue, tax relief on interest, no dilution of earnings per share (compared to say a rights issue), some gearing is advised, so it is likely that the directors will seek to raise more debt in the future. Whether they will aim for exactly the same gearing ratio and use debt with the same cost is less certain.

(b) **Suitability**

The WACC has been calculated to use as a discount rate for appraising the new overseas venture. To use the existing WACC relies on the following assumptions.

- Gearing is kept constant.
- The project has the same business risk as the company's existing activities.
- The project is small.

The figure calculated is *not* suitable for the following reasons.

- It is implied that the project will financed out of retained cash reserves. This will not preserve the current gearing of the company.
- The overseas venture involves a different market with different systematic risk to the bulk of existing activities.
- The project is a major undertaking.

(c) **Three types of bid**

	Advantages	Disadvantages
Cash	• Fizzers has plenty of cash • There will be no dilution of control in Fizzers • Zoom shareholders receive a certain sum	• Depending on the value of Zoom, more cash may have to be found • Zoom shareholders lose their interest in the business
Shares	• Fizzers' liquidity is preserved. Cash surplus can be used elsewhere • Zoom shareholders keep an interest in the enlarged firm	• Issue costs of new shares • Dilution of control for Fizzers' existing shareholders
Loan stock	• No dilution of control for Fizzers' shareholders • Fixed income return may appeal to Zoom shareholders	• Obligation to pay interest • Increased gearing for Fizzers

25 THAMOS LTD

(a) **Cost of capital calculations**

(i) **Dividend growth model (Gordon growth model)**

$$k_e = \frac{D_0(1+g)}{P_0} + g$$

MV = EPS × PE ratio
= 35.8p × 28
= CU10.02 (per share)

$$g = \sqrt[4]{11 \div 4.86} - 1$$

$$= 22.7\%$$

$$\therefore k_e = \frac{11 \times 1.227}{1{,}002} + 0.227$$

$$= 24\%$$

(ii) **Earnings retention model**

$$ke = \frac{D_0(1+rb)}{P_0} + rb$$

This is similar to the dividend growth model except that, instead of basing the estimate of future dividend growth on an extrapolation of past growth, the formula g = rb is used, where

r = Return on reinvested funds ARR

$$b = \text{Retention rate} = \frac{EPS - Dividend}{EPS}$$

	20X2	*20X3*	*20X4*	*20X5*	*20X6*
	%	*%*	*%*	*%*	*%*
ARR	15.6	15.6	17.4	18.5	18.8
Retention rate	70.0	70.0	70.0	70.0	69.0
rb	10.9	10.9	12.2	13.0	13.0

Thamos Ltd has maintained a constant payout ratio over the five-year period. However, its ARR has increased from 15.6% to 18.8%. On the assumption that the most recent results are likely to provide the best basis for a calculation of ke, a growth estimate of 13% is used in the following calculation.

$$k_e = \frac{11 \times 1.13}{1{,}002} + 0.13$$

$$= 14.2\%$$

(b) **Underlying assumptions and their effects**

The calculations in (a) produce estimates of the cost of equity of Thamos Ltd which are markedly different. The range of 14.2% to 24% is more than can be ascribed to rounding errors. At least part of the difference is attributable to the assumptions underlying the models.

Both the dividend growth model and the earnings retention model are based on the belief that the current market value is the discounted present value of the future dividend stream, ie

$$P_0 = \frac{D_0(1+g)}{k_e - g}$$

A strong theoretical case can be made for this model. However, few practising financial managers would be prepared to accept it totally. Most would believe that other variables, such as the underlying assets and short-run reported profits, have an impact on share prices. Neither of these is incorporated in the basic dividend model.

The second assumption common to both the dividend growth model and the earnings retention model is that dividend growth will be constant in perpetuity (although the method used to estimate this figure differs). This is unrealistic, particularly where companies have achieved high growth rates in the recent past.

Thamos Ltd has achieved an average compound growth rate of 22.7% over the last four years. Except under conditions of very high inflation it will not be possible to sustain this growth rate indefinitely. The assumption that what has happened in the past will continue in the future is naive.

The earnings retention model is based on the belief that dividend growth is a function of the proportion of earnings ploughed back into the business and the rate of return earned on those reinvested funds. Again, in order to predict future growth it assumes that the values of both variables will be constant through time. As may be seen in (a) Thamos has maintained a constant payout ratio but this has been made possible by an increasing ARR. The ARR cannot increase indefinitely; indeed, it will probably not be possible to maintain existing levels in the future.

Both models depend on a number of assumptions that may not be reasonable. The constant growth formulae are likely to be more reliable in estimating ke for similar risk companies than they are for individual securities. They are likely to be particularly unreliable for companies with high or unstable historical growth rates.

(c) **Why managers need to know k_e**

A primary task of managers is to make decisions. A decision entails a choice between alternatives and such a choice cannot be made without an idea of the objective to be achieved. Most of the conventional theory in financial management is based on the belief that the objective of the company is to maximise shareholder wealth, ie to maximise the current market value of the ordinary shares. Stated as baldly as this, the assumption may seem unrealistic. Very few chief executives of companies would publicly state that in their decision-making they were exclusively concerned with the maximisation of shareholder wealth.

However, it does seem reasonable to suggest that all executives are extremely concerned about share prices if only in that, if they were allowed to fall too far below what could be achieved, the company would lay itself open to a takeover bid and the executives' jobs could be in jeopardy.

If managers are keen to increase share prices they must know what determines share prices. The price of a share, like the price of everything else, is a function of the demand and supply. If managers are to increase the price of their shares they must stimulate demand. To do this through their investment decisions they must take those investment opportunities that investors would like the company to take. This should make the company popular: people will buy and the share price will rise.

However, how are managers to find out which projects would existing and potential investors like them to undertake? Within a perfect market the manager can assume that investors are satisfied with the return they are earning. If they were not, they would sell the shares, depressing the price and increasing the return until they were satisfied.

The cost of equity is the rate of return that existing and potential investors require in order to persuade them to invest in the shares of the company. If managers accept only those projects which pay a return in excess of that required by investors, they are entitled to assume that they are accepting the projects that investors would like them to accept. This should stimulate demand, resulting in an increase in the share price.

The conclusion is that managers need to know the cost of equity of their companies in order to make investment decisions, ie in order to determine the net present value of prospective projects based on the shareholders' required rate of return.

26 OSMIN LTD

(a) **Calculation of weighted average cost of capital**

Definitions

k = Weighted average cost of capital
k_e = Cost of equity capital
k_d = Cost of debenture capital
k_L = Cost of bank loan
E = Total ex-dividend market value of equity
D = Total ex-interest market value of debt
L = Total value of outstanding bank loan

(i) **Calculation of k_e**

Assuming an underlying dividend growth of g per annum, the average growth rate between 20W7 and 20X1 is given by

$(1 + g)^4 = 13.6 \div 10$

$= 1.36$

$(1 + g) = \sqrt[4]{1.36}$

$= 1.0799$

$g = 8\%$

Assuming that shareholders take past dividend growth as a reasonable approximation to future dividend growth, then using the dividend growth model,

$$k_e = \frac{D_0(1+g)}{P_0} + g$$

$$= \frac{13.6 \times 1.08}{135} + 0.08$$

$$= 18.88\%$$

(ii) **Calculation of k_d**

k_d is the discount rate which equates the present value of future income (CU8 per annum) and redemption (CU100) to the current market price (CU82.50).

Time	Flow	DF @ 10%	PV	DF @15%	PV
	CU		CU		CU
1–4	8.00	3.170	25.36	2.855	22.84
4	100.00	0.683	68.30	0.572	57.20
0	(82.50)	1	(82.50)	1	(82.50)
			11.16		(2.46)

By linear interpolation

$$k_d = 10 + \left(\frac{11.16}{11.16 + 2.46}\right) \times (15 - 10)$$

$$= 14.10, \text{ say } 14\%$$

(iii) **Calculation of cost of bank loan**

The current cost of debt is taken as the best estimate of the future cost of debt, ie 16.5%.

(iv) **Calculation of weighted average cost of capital**

$$k = \frac{k_e E + k_d D + k_L L}{E + D + L}$$

$$= \frac{(4.05 \times 18.88\% + (0.66 \times 14\%) + (0.9 \times 16.5\%)}{4.05 + 0.66 + 0.9}$$

$$= 18\%$$

(b) **Assumptions underlying the use of k as a discount rate**

The weighted average cost of capital should only be used as the target discount rate for appraising investment opportunities whose acceptance will not alter the weighted average cost of capital.

Since the cost of any type of capital can be regarded as a function of a risk-free rate and a risk premium, this implies that k should not be used to evaluate opportunities which have significantly different risk characteristics from the average risk borne by the company prior to acceptance of the project.

In this context it is useful to separate the total risk of the company into business risk and financial risk. The business risk is the risk inherent in the nature of the company's operations. The financial risk is a function of a company's gearing. For a project to be evaluated using k, its acceptance must not alter the company's overall business risk nor must it alter the financial risk. Therefore, it must be of a similar nature to existing projects and it must be financed in such a way that the gearing ratio is unchanged and hence the financial risk is unaltered. In practice k may also be used to evaluate small or marginal projects whose acceptance is unlikely to alter overall corporate risk.

The situation outlined in the question is such that the project being considered could hardly be thought of as marginal. The cost of the project (CU2.5 million) is approximately half of the existing market value of the company. In these circumstances k could only be used as a target discount rate if its business risk were the same as that of existing projects and it were to be financed in the same way as existing projects. This is unlikely to be the case, and as a generalisation it is probably unwise to use the existing k to evaluate such a major investment opportunity.

(c) **Practical problems in estimating k for a large Bangladeshi listed company**

The problems of estimating k can be considered under four headings.

(i) **The validity of the model**

The estimation of k and, in particular ke is based on the assumption that the value of an ordinary share is the discounted present value of the future dividend stream. It is possible that the market is using a different method of valuation, eg based on an earnings multiple; if this is the case, validity of the k_e calculation is undermined.

(ii) **The estimation of the variables in the model**

Here again the major problem is in the estimation of k_e. To calculate k_e it is necessary to know or estimate D_0, P_0 and g. Of these only D_0 can be determined with confidence. P_0 is the ex-dividend value of the share but, for the model to give an accurate estimate of k_e, the market value must be in equilibrium. In practice the market value of an ordinary share may fluctuate daily and it may be extremely difficult to estimate its equilibrium value.

If establishing P_0 is a problem, then estimating g is harder still. Two approaches are frequently used, one based on past dividend growth and one using the Gordon growth model. In using past growth rates an average must be calculated and there is always the danger that the average is misleading. In the question the average dividend growth of Osmin over the past four years has been 8%, although in the most recent year dividends have not grown at all. To what extent is the average growth a meaningful figure? Furthermore, it must be remembered that the growth factor in the dividend valuation model is anticipated *future* growth. Even where the average of past growth rates is meaningful, the use of the average assumes that past growth rates will be sustained in the future.

The earnings retention model is based on the belief that future dividend growth depends on the volume of earnings retained in the business and the rate of return earned on reinvested earnings.

The estimate of g is given by

$g = br$

Where b = the current retention rate

r = the current return on capital employed

Even accepting the naivety of the model and its limitation to pure equity companies, it will only give a useful approximation to g where the retention rate and the rate of return are stable.

(iii) **Fluctuations in the value of the variables through time**

Once the basic rationale for a discounting approach to investment appraisal has been accepted (ie both the magnitude *and* timing of cash flows are relevant), it is incumbent upon the company to establish an appropriate discount rate. The WACC model is a reasonable start to determining the appropriate rate, notwithstanding the obvious difficulties in its application. In practice, a check on the calculations can be made by comparing the result with the WACC of similar companies and with the risk-free rate (the return on government stock).

(iv) **Problems associated with different sources of finance**

In part (a) a calculation was made of the WACC. Osmin is financed entirely by debt and ordinary share capital, and the procedure for calculating the WACC is straightforward. However, in practice many firms use other sources of finance, which make the computation of WACC more difficult.

Specifically, a company may have unlisted preference shares which present problems of estimating their market value; the estimation of the true cost of convertible loan stock is notoriously difficult as the calculation requires an assumption about whether or not the option to convert will be exercised; where a company has substantial foreign currency loans, fluctuations in the exchange rate add a new dimension to the estimate of their cost; and, finally, substantial 'off balance sheet' finance in the form of lease agreements creates further difficulties.

27 CROWLANDS LTD

(a) **Determination of WACC**

Cost of equity

Dividend valuation model

$$k_e = \frac{D_0(1+g)}{P_0} + g$$

$$= \frac{\text{cu}0.23(1+0.05)}{\text{cu}3.70} + 0.05$$

$$= 0.115 \text{ or } 11.5\%$$

Cost of debt

Time	CF	5% factor	PV	10% factor	PV
0	(104.0)	1	(104.00)	1	(104.00)
1–2	12.0	1.859	22.31	1.736	20.83
2	100.0	0.907	90.70	0.826	82.60
			9.01		(0.57)

$$\text{Pre-tax } k_d = 5\% + \frac{9.01}{9.01+0.57}(10\% - 5\%) = 9.70\%$$

Post-tax $k_d = 9.70 \times (1 - 0.21) = 7.66\%$

$$\text{WACC} = \frac{(220 \times 3.70 \times 11.5) + (1.04 \times 100 \times 7.66)}{(220 \times 3.70) + (1.04 \times 100)}$$

$$= 11.06\%$$

The market value weighting was used since, for whatever purpose WACC is needed, it has to be the opportunity cost. This is the value at which the company could raise additional debt or equity and also the price at which debt or equity could be redeemed.

(b) **Reservations about using WACC**

Possible problems with using the WACC calculated above as the discount rate for all of the projects assessed by the company in the forthcoming year include the following.

- There is considerable doubt about the future dividend growth rate. The past rate is not steady, so it is very hazardous to make the assumption that was made. The problem is that if we do not make this assumption, we shall have to make another assumption, equally or more dubious.
- A major determinant of the appropriate discount rate for a particular project is the business risk of that project. Since not all projects have the same risk, the discount rate should not be the same.
- Changes in the level of gearing would affect the weightings: taking on positive NPV projects will of itself alter the gearing.
- There could be other sources of funds that have not been considered, eg a bank overdraft.
- The current market values of the shares and the loan stock feature in the calculation, both of the individual costs of capital and of WACC. Any change in market values would probably alter the WACC.
- Changes in the tax rate could occur over the lifetime of the projects.

These points need to be developed and explained.

(c) **The effect on WACC of a loan stock issue**

In theory according to Modigliani and Miller (with taxes), the loan stock issue should lower WACC and increase shareholder wealth as the value of the additional tax relief is effectively transferred from the Treasury to the shareholders.

Risk (financial) will increase as the existence of greater fixed return commitments would have the effect of making returns to shareholders more variable without any alteration in business risk. Taken to high levels the risk of bankruptcy could adversely affect share prices and lower shareholder value, ultimately to a greater extent than the tax relief would increase it.

Other practical issues include the following.

- Clientele effect
- Agency issues
- Availability of taxable profits
- Signalling

These points would have to be explained and developed.

28 REDSKINS LTD

(a) **Post-tax weighted average cost of capital**

The following calculations are based on the capital structure of the Redskins group, which is deemed to be more appropriate for determining a discount rate to evaluate the projects available to Redskins Ltd and its subsidiaries.

Cost of debt

(1) For irredeemable stock k_d $= \dfrac{\text{Interest}\,(1-T)}{\text{Ex-interest market value}}$

Cost of 3% irredeemable stock $= \dfrac{\text{CU}3.00 \times (1-0.21)}{\text{CU}(31.60-3.00)}$

$\approx 8.29\%$

(2) For redeemable stock, to calculate k_d it is necessary to compute the internal rate of return of the pre-tax cash flows.

		Cash flows	PV at 5%	PV at 10%
		CU	CU	CU
Time 0	Ex-interest market price	(94.26)	(94.26)	(94.26)
Time 1–10	Interest	9.00	69.50	55.31
Time 10	Repayment of capital	100.00	61.40	38.60
	Net present values		36.64	(0.35)

Pre-tax cost of 9% debt $\approx 5\% + \left(\dfrac{36.64}{36.64+0.35}\right) \times 5\% = 9.95\%$

Post-tax cost of debt = 9.95 × (1 – 0.21) = 7.86%

(3) After-tax cost of bank loan = (11% + 2%) × (1 – 0.21)
= 10.27%

(4) Cost of 6% unquoted stock

The value of the stock is the present value of the pre-tax cash flows discounted at 10%,

ie (CU6.00 × 6.145) + (CU100 × 0.386) = CU75.47

The pre-tax cost is 10%

The post-tax cost is 10 × (1 – 0.21) = 7.9%

Cost of equity = 18% (given)

The values of the various sources of finance are as follows.

	CU'000	CU'000
Equity	8,000 × 1.1	8,800
3% debt	1,400 × 0.286	400
9% debt	1,500 × 0.9426	1,414
6% debt	2,000 × 0.7547	1,509
Bank loan		1,540

$$k = \frac{(0.18 \times 8,800) + (0.0829 \times 400) + (0.0786 \times 1,414) + (0.079 \times 1,509) + (0.1027 \times 1,540)}{8,800 + 400 + 1,414 + 1,509 + 1,540}$$

$$= \frac{2,005.7}{13,663}$$

$$= 14.7\%$$

(b) **Problems in estimating k**

(i) **Where bank overdrafts are used as sources of long-term finance**

Theoretically bank overdrafts are repayable on demand and therefore are current liabilities. However, it is undoubtedly true that many firms run more or less permanent overdrafts and effectively use them as a source of long-term finance. Where this is true, a case can be made for incorporating the cost of the overdraft into the calculation of the weighted average cost of capital. In order to do this it is necessary to know the interest rate and the size of the overdraft.

The first of these variables, the interest rate, presents no special problems. Overdraft rates are known and the quoted rate is the 'true' rate. As with other interest payments, overdraft interest is an allowable expense for tax purposes and this must be incorporated in the calculation. Interest on overdrafts fluctuates through time and this presents a problem. However, it is not a problem unique to overdrafts, as other interest rates are also likely to vary.

The particular problem in incorporating the cost of an overdraft into the WACC is determining its magnitude for weighting purposes. By their very nature overdrafts vary in size on a daily basis. It would be necessary to separate the overdraft into two components. The first is the underlying permanent amount which should be incorporated into the WACC. The second component is that part which fluctuates on a daily basis with the level of activity. A technique similar to that used to identify the fixed and variable elements of semi-variable costs could be used to separate these two component parts.

(ii) **Where convertible loan stocks are used as sources of long-term finance**

The formula for determining the cost of a convertible loan stock k_c derives from the basic valuation model for convertibles as follows.

$$V_c = \sum_{t=1}^{n} \frac{\text{Interest}(1-T)}{(1+k_c)^t} + \frac{\text{MV(or RV)}}{(1+k_c)^n}$$

Where T = Rate of corporation tax

n = Years to conversion

MV = Market value of shares at the time of conversion (or redemption value if not converted)

k_c = Cost of convertible stock

V_c = Market value of convertibles

In principle the calculation of k_c is a simple IRR computation. In practice the difficulty is in knowing whether the investor will exercise his conversion right, which will depend upon the market value of the shares at the time of conversion. Therefore, to compute k_c requires a prediction of future share prices, which obviously poses severe problems.

(c) **Fundamental assumptions underlying the use of k as a discount rate**

It can be shown that in a perfect capital market, in which the market value of an ordinary share is the discounted present value of the future dividend stream, acceptance of a project which has a positive

NPV when discounted at the WACC will result in the share price increasing by the amount of the NPV. It is this relationship between the NPV and the market value which is the basis of the rationale for using the WACC in conjunction with the NPV rule.

However, the use of the WACC in this way depends upon a number of assumptions.

(i) The objective of the firm is to maximise the current market value of the ordinary shares. If the firm is pursuing some other objective, eg sales maximisation subject to a profit constraint, some other discount rate may be more appropriate.

(ii) The market is perfect and the share price is the discounted present value of the dividend stream. Market imperfections may undermine the relationship between NPV and the market value, and cast doubt upon the usefulness of WACC as a discount rate. Furthermore, if the market values shares in some other way (earnings multiplied by a PE ratio?), then the link will also be broken.

(iii) The current capital structure will be maintained (otherwise the cost of equity and WACC will change).

(iv) The project is of the same risk as the existing activities (otherwise the cost of equity and WACC will change).

(v) The finance for the project comes from a pool of funds and is not project-specific.

29 GALE LTD

(a) Cost of irredeemable debentures (market value CU43.25m):

$K_d = 7\times(0.79)/86.50 \times 100 = 6.39\%$

Cost of unsecured loan notes (market value CU30.24m):

	Cashflow	df10%	PV	df5%	PV
t0	(84.00)	1	(84.00)	1	(84.00)
t1-7	6.00	4.868	29.21	5.786	34.72
t7	100.00	0.513	51.30	0.711	71.10
			(3.49)		21.82

Pre-tax $K_d = 5 + 21.82/(21.82 + 3.49) \times 5 = 9.31\%$

Post-tax $K_d = 9.31 \times (1 - 0.21) = 7.35\%$

Cost of irredeemable preference shares (market value CU7.7m):

$K_p = 5.5/77 \times 100 = 7.14\%$

Cost of equity (market value CU49m):

Dividend growth rate = $10.00 \times (1 + g)^4 = 15.75$

Therefore, g = 12%

$K_e = (15.75 \times 1.12)/350 + 0.12 = 17.04\%$

WACC = (43.25m × 0.0639)+(30.24m × 0.0735)+(7.7m × 0.0714)+(49m × 0.1704)/130.19m

WACC = 13,885,695/130,190,000 × 100 = 10.67%

(b) As bank overdrafts are repayable on demand, they are accounted for as current liabilities. However, in practice for many companies bank overdrafts are used as a permanent, long-term source of finance. In such circumstances, therefore, it can be entirely justifiable to include bank overdraft financing costs in a WACC calculation.

In order to include such finance in the calculation, however, we need to know two things – the interest rate (though fluctuating, not a problem in the short term – and an average of the fluctuating rate could reasonably be used) and the size of the overdraft (often problematic). We need to know the size of the overdraft for weighting purposes in the WACC calculation, but, by definition, overdrafts fluctuate on a daily basis.

The way forward in such circumstances would be to analyse the actual operation of the overdraft to identify the core permanent element of the fluctuating overdraft – it is this core element that can justifiably be included in any WACC calculation.

(c) The rate of return required on each source of finance used by the company depends on its perceived risk by investors. Equity is perceived by investors as the most risky source of finance and, therefore, requires the

greatest return, whilst debt is perceived as less risky than equity, therefore requiring a lower rate of return than equity.

In the traditional view of capital structure shareholders tend to be indifferent to the addition of relatively small amounts of debt finance, and so the view is that a company's WACC will fall as debt finance increases in the capital structure. This line of thinking would appear to endorse the chief executive's views. However, if gearing continues to increase the cost of equity will increase to include a financial risk premium, whilst at extreme levels of gearing both the cost of equity and the cost of debt will increase to reflect not only financial risk but also bankruptcy risk.

In contrast to the traditional view, M&M, assuming a perfect capital market (no bankruptcy risk and no taxes), demonstrated that a company's WACC remained constant as a company geared up, with the increase in the cost of equity arising from increased financial risk exactly offsetting any benefits from lower cost debt in the capital structure. WACC is therefore viewed as being constant at all levels of gearing. This line of thinking appears to contradict the chief executive's views.

However if the assumptions of a perfect capital market are relaxed, WACC is seen to fall as gearing increases due to the tax shield on debt. This line of thinking again appears to endorse the chief executive's views.

However, in the real world, even the benefits of the tax shield can be more than offset by the effects of increased bankruptcy risk at high levels of gearing. This line of thinking suggests that whilst the chief executive's views carry some weight, they cannot be adopted in the extreme and minimising the company's WACC is, therefore, about identifying the appropriate level of debt in the capital structure from the investor's viewpoint.

CHAPTER 6

Capital structure

Introduction

Examination context

Topic List

Introduction

Learning objectives

Tick off

- To explain and illustrate what is meant by financial risk ☐
- To explain the traditional view of gearing ☐
- To explain the M & M view of gearing ☐
- To outline the key aspects of capital structure ☐

Syllabus reference relevant to this chapter is 1l.

Syllabus links

The theory behind this chapter is seen elsewhere in this subject, and the practical issues of capital structure are explored again in advanced level and the final case study.

Examination context

Exam questions on this topic are likely to require an explanation of the underlying theory of capital structure and then a description of any shortcomings of the theory and the practical issues surrounding gearing.

1 Capital structure

Section overview

- Gearing normally refers to the increased risk faced by shareholders as a consequence of borrowing.
- Gearing can be operating or financial.
- Traditional view of gearing – there is an optimal capital structure.

1.1 Business and financial risk

Definition

Business risk is the variability in earnings *before* interest and tax associated with the industrial sector in which a firm operates.

It is determined by general business and economic conditions.

Well-diversified shareholders will only be interested in risk that cannot be diversified away, ie the systematic element of business risk ('systematic business risk').

Definition

Financial risk is the additional variability in returns as a result of having fixed interest debt in the capital structure. Equity holders take this risk in particular, but debt holders also suffer financial risk at high gearing levels (see later in chapter).

NB Financial risk is narrowly defined here for the purpose of this chapter. A wider definition of financial risk might include liquidity risk, interest rate risk, currency risk etc (see chapters 9 and 10)

1.2 Gearing

Operating gearing (or risk) is the extent to which a firm's operating costs are fixed, as opposed to variable. Firms with high operating gearing, eg steel plants, oil refineries, have high break-even points and earnings before interest and tax (EBIT) which are very sensitive to changes in sales. Operating gearing is linked to business risk.

Financial gearing is the extent to which debt is used in the capital structure. This can be measured in two ways:

- **Capital** terms (normally by market values*)

$$\frac{\text{debt}}{\text{equity}} \text{ or } \frac{\text{debt}}{\text{debt} + \text{equity}}$$

  * Where no market values are available then book values should be used. For the purpose of this exam the book value of debt is to be taken as its total nominal value. Either of these expressions is acceptable.

- **Income** terms using interest cover

$$\frac{\text{EBIT}}{\text{Interest}}$$

Note: For the purposes of ICAB Financial Management, preference shares should be treated as debt for gearing calculations.

Worked example: Demonstration of gearing

A company has CU40m of debt on which it pays 5% interest. The company's expected results are as follows:

	CUm	CUm
Sales		10
Variable costs	2	
Fixed costs	5	
		7

Ignoring tax, show the effect of the fixed costs and the interest cost on the volatility of the earnings, and the interest cover if sales

(a) Decrease by 10%
(b) Increase by 10%

Solution

The following shows an abbreviated statement for a financially geared firm before and after a 10% decrease in sales and a 10% increase in sales.

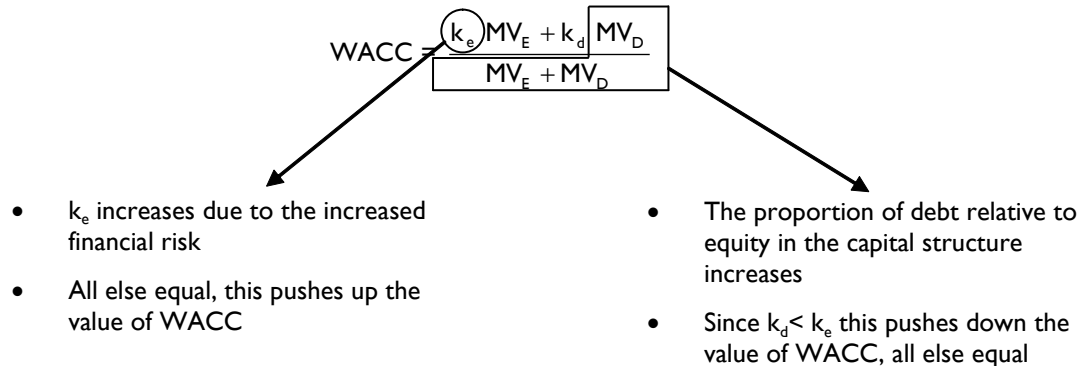
Sales before			Decreased sales			Increased sales		
	Before		Comment	After		Comment	After	
	CUm	CUm		CUm	CUm		CUm	CUm
Sales		10	– 10%		9.0	+ 10%		11.0
Variable costs	2		– 10%	1.8		+ 10%	2.2	
Fixed costs	5		no change	5.0		no change	5.0	
		(7)			(6.8)			(7.2)
EBIT		3	– 262/3%		2.2	+ 262/3%		3.8
Interest (CU40m @ 5%)		(2)	no change		(2.0)	no change		(2.0)
Earnings before tax		1	– 80%		0.2	+ 80%		1.8
Interest cover	3 ÷ 2 = 1.5			2.2 ÷ 2 = 1.1			3.8 ÷ 2 = 1.9	

Conclusion. Returns are enhanced when sales increase but the position is reversed when sales fall. Financial gearing affects the volatility of equity earnings and, therefore, requires a premium to be reflected in the cost of equity.

This can be seen in the $26^2/_3\%$ change in EBIT and the 80% change in earnings before tax created by only a 10% change in sales.

1.3 What happens if gearing changes?

As a company *gears up* financially two things happen:



The effect of increased gearing on the WACC depends on the relative sizes of these two opposing effects. So how, *precisely*, does the gearing affect the WACC and, therefore, shareholder wealth?

1.4 Traditional view of gearing

The traditional view is that as an organisation introduces debt into its capital structure, the **weighted average cost of capital will fall**, because initially the benefit of cheap debt finance more than outweighs any increases in the cost of equity required to compensate equity holders for higher financial risk. Initially, there is very little change in the shareholders' required returns.

As gearing continues to increase, the equity holders will ask for progressively higher returns and eventually this increase will start to outweigh the benefit of cheap debt finance, and the **weighted average cost of capital will**

rise. At extreme levels of gearing the cost of debt will also start to rise (as debt holders become worried about the security of their loans) and this will also contribute to an increasing weighted average cost of capital.

Conclusions

- There is an optimal level of gearing at which the value of the firm's equity plus debt is maximised. This occurs at the point where the WACC is minimised (This is shown in the diagram in section 2.3 below)
- There is no precise method of calculating k_e or WACC, or indeed the optimal capital structure. The latter needs to be found by trial and error by changing the gearing and seeing how the market responds
- The above conclusion applies equally to situations either with or without corporation tax
- If simplifying assumptions are made (ie that both interest and dividends are constant perpetuities and debt is irredeemable), then

$$MV_E + MV_D = \frac{\text{earnings}(1-T)}{\text{WACC}}$$

Given any set of earnings, if the lowest WACC is maintained, projects will have the highest NPV (at the lowest discount rate) and shareholder wealth is maximised

2 Modigliani and Miller (M&M) 1958 & 1963

Section overview

- In a no-tax world, there is no optimum gearing level.
- In a taxed world debt is a tax efficient way to finance a business.

In 1958 and 1963 M&M published papers on capital structure which were at odds with the traditional approach.

2.1 M&M 1958

M&M showed in 1958 that with no corporation tax there is *no* advantage for firms to issue debt (gear up).

Worked example: Capital structure (ignoring effect of tax)

A company generates EBIT (earnings before interest and tax) of CU100m. It currently has no debt in the capital structure. It is considering the use of debt, and is exploring raising CU800 million or CU1,800 million. Interest is payable at 5%.

Requirement

Ignoring taxation and assuming all earnings after interest are paid out as dividends, find out which is the most attractive capital structure.

Solution

The total returns to all investors needs to be calculated.

		No debt	CU800m debt	CU1,800m debt
		CUm	CUm	CUm
EBIT		100	100	100
Interest	(CU800m @ 5%)	–	(40)	
	(CU1,800m @ 5%)			(90)
Dividends		100	60	10
Dividends + Interest		100	100	100

The **total** distributions to providers of finance are the same, no matter what the level of gearing.

Thus these firms should be worth the same in **total**, as they generate the same total distributions for investors with the same business risk.

M&M showed in 1958 that:

V_g = V_u

V_g: value of debt + value of equity in geared firm

V_u: value of equity in equivalent ungeared firm

The implication is that the WACC is constant no matter what the gearing level.

This suggests that there is *no* optimal level of gearing. The benefits of cheap debt finance are exactly offset by the increased returns required by shareholders for the extra financial risk – the cost of equity rises in direct proportion to the increased gearing.

In the traditional view it was felt that at lower gearing levels the increase in required return was less than proportional. The result of this is that under the traditional view the WACC falls at low gearing levels.

2.2 M&M 1963

M&M showed in 1963 that, in the presence of corporation tax, it is advantageous for firms to issue debt (gear up).

Interactive question 1: Capital structure with effect of taxation

[Difficulty level: Easy]

The same situation as in the Capital structure worked example above, but this time corporation tax is payable at 21%.

	No debt	CU800m debt	CU1,800m debt
	CUm	CUm	CUm
EBIT	100	100	100
Interest	–	(40)	(90)
	100	60	10

Requirement

Which capital structure is most attractive in terms of total amount paid to investors, taking into account the tax payable?

See **Answer** at the end of this chapter.

2.3 Conclusion

The effect of interest being allowable against tax means that geared companies pay less tax. This means geared companies will have more cash to pay out to investors, and therefore are worth more. The optimal capital structure is therefore a geared one.

More formally M&M showed in 1963 that:

V_g = V_u + DT

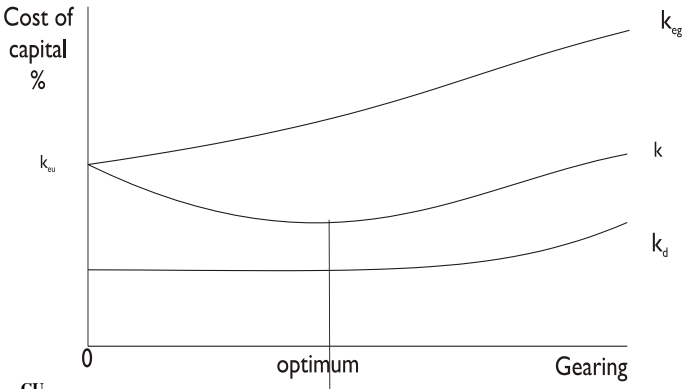
value of debt + value of equity in geared firm	value of equity in equivalent ungeared firm	tax shield on debt where T is the corporation tax rate and D is the market value of the geared firm's debt

The implication is that the WACC falls as the gearing level rises.

Here the benefits of the tax relief mean that increasing amounts of debt reduce the WACC and this is *less* than offset by the increasing returns required by shareholders which push up the WACC, ie overall the WACC declines.

This suggests that the optimal level of gearing is nearly 100% debt.

The implications of increased debt causing the WACC to rise due to additional gearing has implications for how debt financed investments are assessed. This is explored in section 4 on Adjusted Present Value (APV).

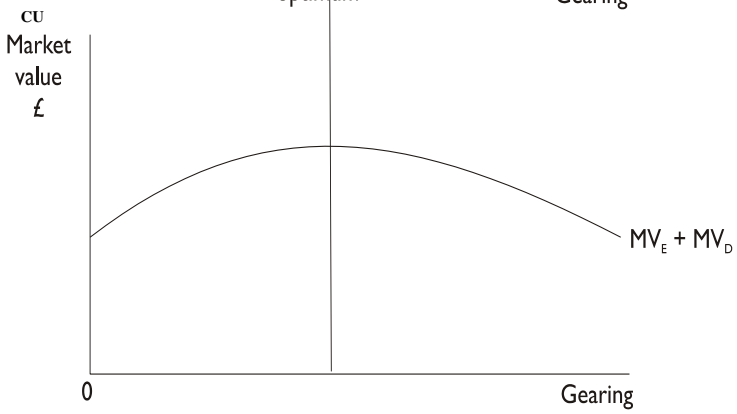


k_{eu} = cost of equity in ungeared firm (reflects business risk only)

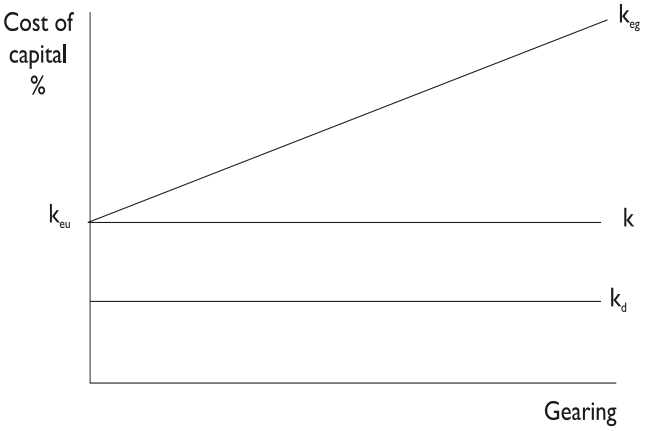
k_{eg} = cost of equity in geared firm (reflects business and financial risk)

k_d = cost of debt

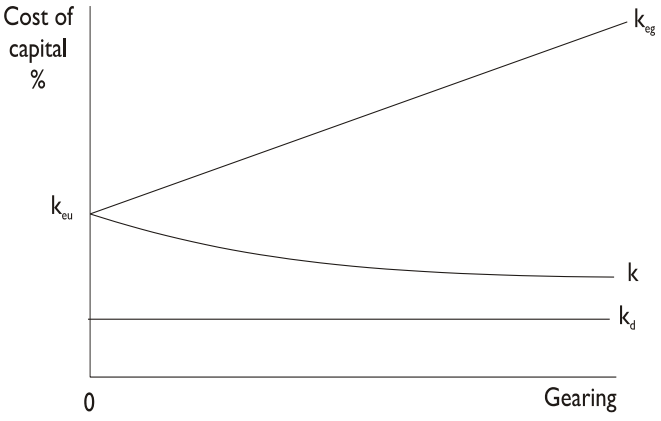
k = WACC



The traditional view of gearing



M&M 1958 position



M&M 1963 position

3 Capital structure and high gearing

Section overview

- High gearing as advocated by M&M has some problems with it, there being bankruptcy costs, agency costs and tax exhaustion.
- Managers can act in ways which prefer shareholders to debtholders and so increase bankruptcy costs.
- Lenders use loan covenants to protect their position.

3.1 Problems associated with high levels of gearing

A brief examination of company balance sheets would reveal that in reality companies do not use 100% debt gearing levels. The reasons for this are usually categorised as follows:

(a) Bankruptcy costs
(b) Agency costs
(c) Tax exhaustion

3.2 Bankruptcy costs

The basic M&M with-tax equation is

Market value of the firm = Value if all-equity financed + Value of the tax shield

As firms take on higher levels of gearing, the chances of default on debt repayments, and hence liquidation ('bankruptcy'), increase. Investors will be concerned over this and sell their holdings, which will cause the value of the company's securities to fall, with a corresponding increase in the firm's cost of funds. To optimise capital structure, financial managers must therefore not increase gearing beyond the point where the cost of investor worries over bankruptcy outweighs the benefits gained from the increased tax shield on debt.

Thus the M&M equation can be written:

Market value of the firm = Value if all-equity financed + Value of the tax shield – Bankruptcy costs

It is not bankruptcy in itself that is the problem but the costs that accompany it. These costs may be categorised as follows.

Direct costs of bankruptcy

- If a firm is liquidated, its assets are usually sold at less than their going-concern value. Liquidation costs, redundancy costs and distress prices for assets can all lead to assets realising less than their economic value
- These costs mean that the company's going concern value will be greater than its winding-up value. This loss in value will often be **borne by the debt holders** in the event of bankruptcy
- To compensate for this, investors in both debt and equity will ask for higher rates of return from highly-geared companies and thus drive down the prices for their securities

Indirect costs of bankruptcy

These costs can be suffered by companies that eventually go bankrupt or by those that hover close to bankruptcy for many years. They relate to the problems of operating a company under severe financial distress.

Interactive question 2: Acceptable debt levels [Difficulty level: Intermediate]

Jethro Ltd has very high debt levels, well over what is considered normal for this type of company, and has had for a number of years. There are likely to be implications for many of the stakeholders:

Stakeholders	What are the implications?
• The managers	
• Asset replacement	
• Key employees	
• Suppliers	
• Customers	
• Ability to enforce contracts	

See **Answer** at the end of this chapter.

3.3 Conflicts between shareholders and debt holders

There are ways in which managers (appointed by shareholders) can act in the interests of the shareholders rather than the debt holders and in doing so, contribute to the indirect costs of bankruptcy, for example:

- Paying large cash dividends will realise part of the company's value for the shareholders at the expense of the debt holders
- Managers may try to hide the extent of a firm's poor financial state by cutting back on research, maintenance, etc and thus improve the results of 'this year' at the expense of those of 'next year'. This 'playing for time' tactic can worsen a debtholder's position
- Management may negotiate a loan for a relatively safe investment project offering good security, and therefore carrying only modest interest charges, and then use the funds to finance a far riskier investment
- Management may arrange further loans which increase the risks of the initial lenders by undercutting their asset backing

It is probably fair to say that most managers do not actively set out to deceive lenders, as they have little to gain – after all most of them are employees rather than owners and may suffer considerable personal loss if their company goes bankrupt (it is often not easy for the financial director of a failed firm to find similar employment elsewhere). In addition, they know that, although these tactics may be to the short-run gain of the equity holders, they cannot expect to win in the long run – one may deceive a lender once but it is doubtful if the deception will work a second time.

Nevertheless, it is because of the risk that managers might act in this way that most loan agreements (see Chapter 4) contain restrictive covenants for protection of the lender. Complying with such covenants places a restriction on the actions of managers and imposes a potential additional cost of borrowing.

These restrictions on the managers or agents are referred to as **agency costs**.

3.4 Loan covenants

Covenants used by suppliers of debt finance can be divided into four main categories:

- **Restrictions on issuing new debt**

  These usually prevent the issue of new debt with a superior claim on assets unless the existing debt is upgraded to have the same priority, or unless the firm maintains a minimum prescribed asset backing. Restrictions on asset rentals, leasing, and sale and leaseback are also often used.

- **Restrictions on dividends**

  Dividend growth is usually required to be linked to earnings. Repurchase of equity (effectively a dividend) is also often restricted.

- **Restrictions on merger activity**

  Debt covenants may prohibit mergers unless post-merger asset backing of loans is maintained at a minimum prescribed level.

- **Restrictions on investment policy**

  Covenants employed include restrictions on investments in other companies, restrictions on the disposal of assets, and requirements for the maintenance of assets. This is usually considered to be the most difficult aspect for creditors to monitor.

Contravention of these agreements will usually result in the loan becoming immediately repayable, thus allowing the debenture holders to restrict the size of any losses. Obviously no set of covenants can completely protect creditors, and any remaining risks will be covered by the interest rate charged and by securing loans on the assets of the company.

3.5 Tax exhaustion

A further disincentive to high gearing is that the firm must be in a taxpaying position to obtain the tax shield on debt. At a **certain level of gearing** companies will discover that they have no taxable income left against which to offset interest charges. This is particularly likely if they have been investing heavily and are in receipt of large capital allowances. After this point firms will experience all the problems of gearing but none of the advantages.

The effect of the risks and costs of bankruptcy, the agency costs and tax exhaustion is likely to push up both the cost of equity and the cost of debt.

The conclusion is that the WACC is likely to be saucer shaped and that there is now an optimal level of gearing, but no easy way of determining where it is. In other words, **the traditional view**.

The next section looks at some of the factors which determine the amount of gearing a firm should have.

3.6 Practical aspects in the capital structure decision

In addition to the above points, the following practical aspects apply equally to the traditional and M&M theories:

- **Business risk**

  Gearing adds financial risk on top of business risk; hence the higher the business risk (including operating risk), the lower the gearing tends to be

- **Bankruptcy**

  Bankruptcy costs (legal, administrative, accountancy, forced sale of assets at less than market value) have a higher chance of being incurred the higher the gearing

- **Quality of assets**

  Lenders look for security: thus firms with substantial tangible assets (land, buildings, plant and equipment) tend to be able to borrow more

- **Availability of other sources of finance**

  Small firms may have limited access to external finance and are forced to use equity (eg retained earnings) rather than borrowings

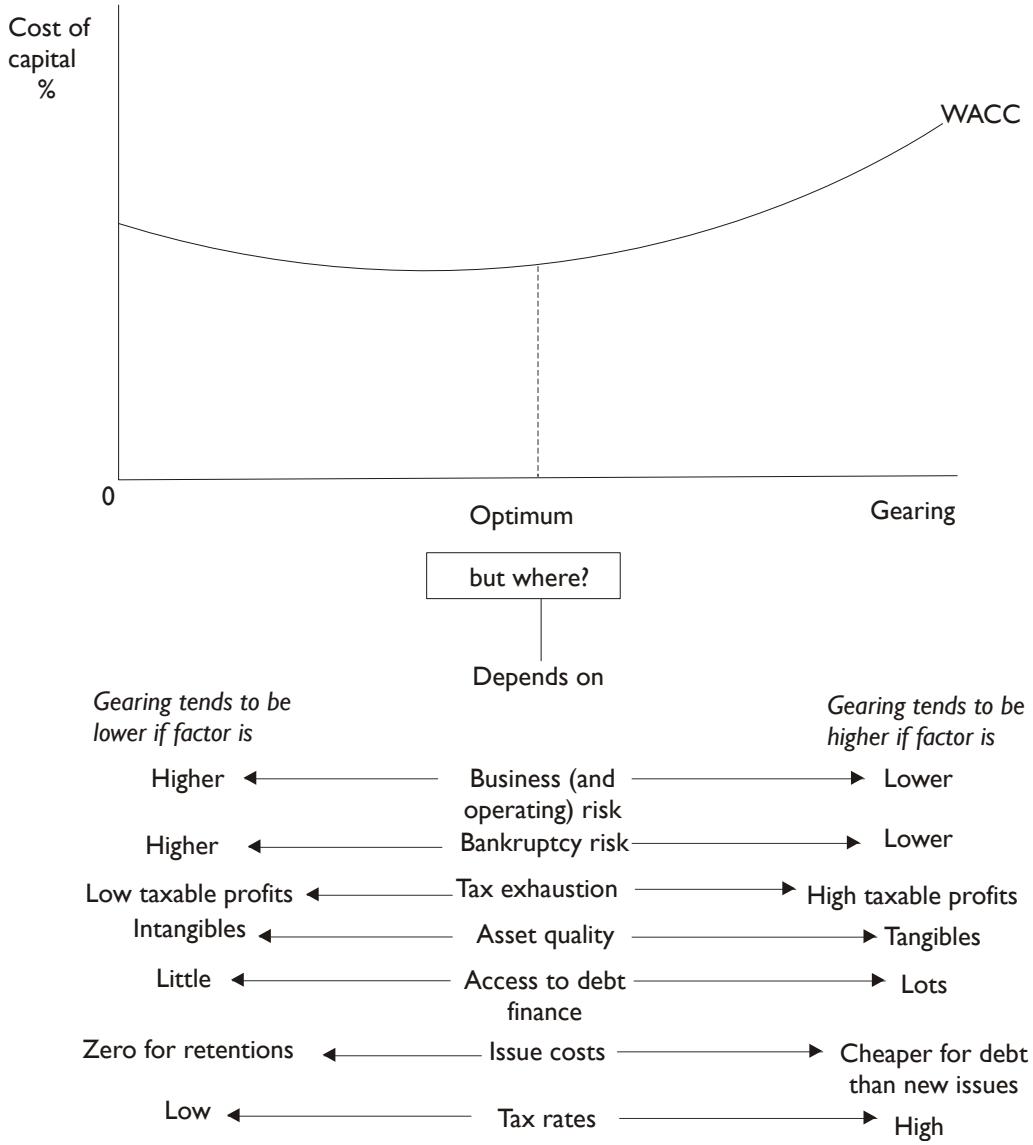
- **Cost of raising finance**

Issue costs are zero for retained earnings, whereas new issues (including rights) are much more expensive. Loan finance is cheap to raise

- **Tax rate**

  The higher the tax rate the higher the tax relief on interest, subject to tax exhaustion.

  The above aspects are depicted in the diagram below



In addition the following should be borne in mind:

- **Signalling**

  Raising debt could be taken as a sign of confidence by investors, ie the directors are sufficiently confident about future prospects that they are willing to expose the business to fixed capital and interest payments

- **Clientele effect**

  Particular shareholders (a 'clientele') may be satisfied with the *existing* level of gearing of a firm (eg in the context of their wider portfolios of investments). A change in the level may not suit them and they may sell their shares. Equally the change in gearing may suit new investors who would want to buy the firm's shares. The net effect may be adverse, ie the wealth of the original shareholders may fall.

4 Adjusted present value

Section overview

- In a with tax world, M&M argued that changing the capital structure may cause the cost of capital to alter.
- Projects financed with new debt can be evaluated using the Adjusted Present Value (APV) technique.
- APV – Find the base case NPV @ k_{eu}
  - Adjust for the present value of the tax shield @ pre tax cost of debt

4.1 Changing capital structure

Worked example: Changing gearing

Spears Ltd is currently an all equity company. It is considering borrowing a significant amount to finance a new project. The new project is similar, in terms of business risk, to the existing projects.

(a) What will happen to the company's cost of capital?
(b) What cost of capital should be used to assess the new project

(i) The existing cost of capital?
(ii) The cost of the new debt?
(iii) The new WACC?

Solution

(a) The increased level of gearing may cause the overall WACC to fall, due to the tax shield on the debt interest.

(b) The company's existing cost of capital (the cost of equity k_e) is inappropriate, as the new gearing will have altered it.

The cost of the new debt is not the correct discount rate, because the cost of debt does not reflect the risk that will be borne by the shareholders.

The new WACC is difficult to identify, for the following reason:

$$\text{WACC} = \frac{k_e MV_e + k_d MV_d}{MV_e + MV_d}$$

One component of the above is the market value of the shares (MV_e in the above equation) – which reflects the impact of both the new debt **and** the project.

The impact of the new project on the share value is its NPV – the value of the shares should reflect the wealth created by the project.

The NPV requires the new cost of capital (the new WACC) to be known.

Thus there is a problem – to find the new cost of capital requires the new market value of the shares, this requires the NPV to be known which in turn requires the new cost of capital.

4.2 Adjusted present value

The Adjusted Present Value (APV) approach can be used to address the above problem in the following way:

1 Calculate a base case value of a project using k_{eu} (cost of equity for an ungeared company), this gives the value of the project as if it were ungeared

2 Establish the present value of the tax shield arising as a result of the debt capacity generated by the project. The appropriate discount rate for the tax shield is the pre tax cost of debt.

Adding these two together gives an Adjusted Present Value (APV) which should be interpreted in the same way as an NPV. For example, a positive value for the APV indicates an increase in shareholder wealth, and so the project should go ahead.

Interactive question 3: APV

[Difficulty level: Intermediate]

Toes Ltd, currently all equity financed, is considering a project which will involve investing CU240 million now and will generate annual post-tax net cash flows of CU40 million for each of the next 10 years. The project will use buildings and equipment which, when used as security, will enable Toes Ltd to borrow CU187.5 million at a rate of 8%. The costs of issuing the debt are CU1 million. The debt will last as long as the project: 10 years.

Corporation tax rate is 21%.

If the project were to be funded entirely by equity, the cost of capital would be 12%.

Requirement

Establish whether Toes should go ahead with the project, by completing the table below.

Question	Answer
Project base case?	
Value of tax shield? • Interest charge • Tax relief per annum • Present value at pre tax cost of debt	
Adjust for the issue cost	

See **Answer** at the end of this chapter.

4.3 Problems with the APV approach

The technique is based upon the assumptions of M&M with tax. That means that issues such as agency costs and financial distress may affect the attractiveness of debt finance which are not reflected in this technique.

5 Gearing and the CAPM

Section overview

- Revisiting CAPM again briefly, the β_e (beta of equity) is sensitive not only to the amount of systematic risk but also to the amount of financial risk, ie the level of gearing.

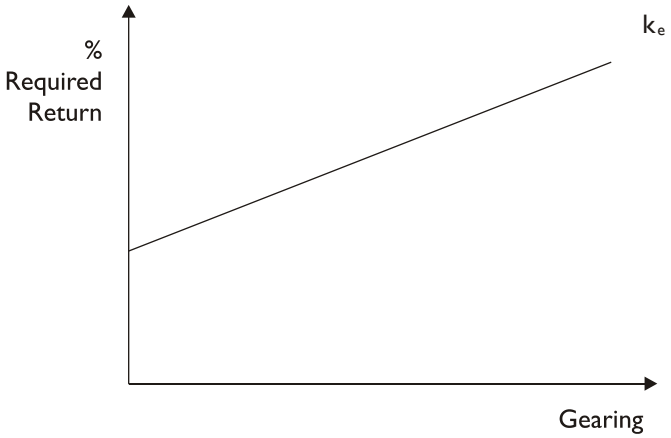
Worked example: Gearing betas

What happens to the required return on a share if the company takes on more debt?

What are the implications of this for the beta value?

Solution

The relationship between the required return on a share and the level of gearing is as shown in the graph.



The reason the required return goes up is because as a company borrows more, the risk that the shareholders face will increase.

It follows that a geared company's shares will have a higher beta.

This is because *financial risk applies systematically* ie it cannot be diversified away.

In the CAPM the β_e rises as gearing increases. (Debt can also have a beta such that the required return is greater than the risk free rate. For simplicity in what follows it is assumed that debt is risk free and its beta is zero.)

The assets of a business contain only systematic business risk which is measured by β_a (asset beta). In an ungeared firm this must be the same as β_e (there is no financial risk). But, as gearing increases the β_e increases, such that $\beta_e > \beta_a$. One way of relating β_e, β_a and the level of gearing (assuming risk free debt) is

$$\beta_e = \beta_a \left(1 + \frac{D(1-T)}{E}\right)$$

where D and E are the market values of debt and equity respectively, and T is the corporation tax rate.

One particular use of this relationship is deriving discount rates for project appraisal which take account of both the systematic risk of the project and the financing risk.

While the CAPM is a less than perfect theory, it is robust enough to be widely used in the real world and certainly adequate for the examination. Thus a risk-adjusted discount rate based on the systematic risk of a project can be devised and used to derive the project's NPV, in order to determine whether or not it is acceptable.

Interactive question 4: CAPM

[Difficulty level: Intermediate]

Hubba Ltd, an all equity financed food manufacturer, is about to embark on a major diversification into the consumer electronics industry. Its current equity beta is 1.15, 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.

$r_m = 25\%$ $r_f = 10\%$ $T = 21\%$

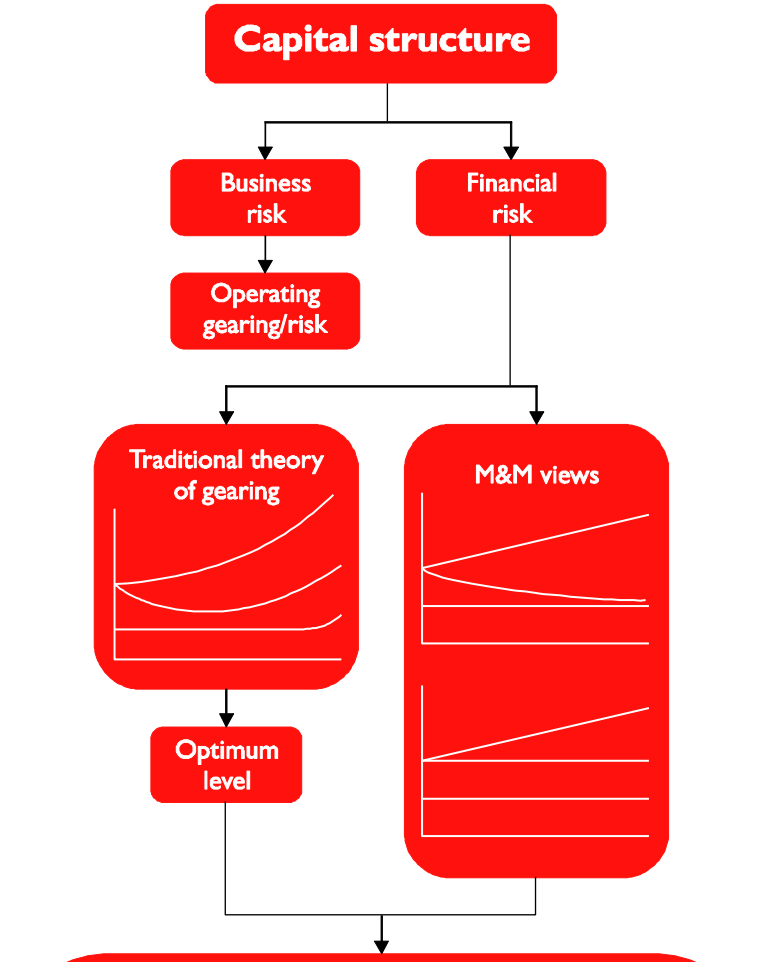
Requirement

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

(a) Entirely by equity
(b) By 30% debt, 70% equity (by market values)
(c) By 40% debt, 60% equity (by market values)

See **Answer** at the end of this chapter.

Summary


Capital structure
Business risk
Financial risk
Operating gearing/risk
Traditional theory of gearing
M&M views
Optimum level
Practical aspects
– Most businesses seem to use gearing, but not to very high levels.
– Business with high operating gearing may be unsuitable for high financial gearing.
– Lenders may use covenants to protect their position.
– Businesses may attract shareholders because of their gearing level.
– High tax rates will encourage high gearing.
– Tax capacity may well affect gearing levels.
– The relative costs of raising funds:
– Equity from retained earnings – virtually nothing.
– Equity from rights or public issues – very expensive.
– Debt finance – relatively cheap.
– Issuing debt could be taken as a sign of confidence by investors.

Self-test

Answer the following questions.

1 If for a given level of activity a firm's ratio of variable costs to fixed costs were to rise and, at the same time, its ratio of debt to equity were to fall, what would be the impact on the firm's financial and operating risk?

2 A tax-paying company is financed in equal proportions by equity and debt. The interest on debt is tax deductible at the corporation tax rate of 21%.

What will be the effect of an increase in the rate of corporation tax on the value of the company?

3 An extract from the balance sheet of Jug Ltd is as follows.

	CU
Ordinary shares of CU1 each	3,000,000
Reserves	11,000,000
Total equity	14,000,000

The current market value of the shares is CU8.

The company also has in issue CU16 million of debt, which you can assume to be risk-free, which is currently valued at par.

The equity beta of Jug is 1.20.

The company proposes to issue new shares to raise CU4 million in order to pay off some of its debt. The tax rate is 21%.

Assuming there are no transaction costs with issuing the new shares or redeeming CU4 million of debt, what should the equity beta of the company be after the capital restructuring?

4 A company is considering a new project that would earn cash profits before tax of CU5,000,000 per annum for three years. Tax is at the rate of 21% of cash profits. The cost of the project would be CU7,500,000 and the finance would be obtained by obtaining a three year loan at 10% interest, for which annual repayments would be as follows:

End of year	*Capital repayment*	*Interest*	*Total payment*
	CU'000	CU'000	CU'000
1	2,500	750	3,250
2	2,500	500	3,000
3	2,500	250	2,750

Loan issue costs would be CU100,000. The loan would significantly alter the company's gearing. Its current weighted average cost is 12%, but if the company were all equity financed, its cost of capital would be 13%.

What is the adjusted present value of the project, to the nearest CU100,000?

5 SORINA LTD

Sorina Ltd has always been an all equity financed company with a cost of capital of 15%. The finance director, Mr Brush, has read an article extolling the benefits of raising debt finance and has asked you to provide him with advice as to how Sorina Ltd should finance itself for the future. He is also interested in what discount rate he should be using for project appraisal. In order to assist you Mr Brush has helpfully collected data on four companies which is summarised below.

Company	*Debt : Equity ratio*	*Ex-div share price*	*Dividend per share*
P	0	CU1.00	12p
Q	1:1	CU2.00	36p
R	0	CU1.50	24p
S	1:3	CU3.00	58p

For each of these companies the dividends have been constant at the above levels for many years. Companies P and Q operate in the same industrial sector, while companies R and S both operate in a different industrial sector which is perceived as more risky than that of P and Q.

All four companies and Sorina Ltd itself operate in Widbergia, a country that is at present a tax-free society.

You also ascertain that debt, which may be assumed to be risk-free, is currently yielding 6% per annum to investors.

Requirements

(a) Comment on the data supplied by Mr Brush in relation to the optimal capital structure of Sorina Ltd and advise on an appropriate discount rate for project appraisal. **(8 marks)**

(b) Indicate how your advice might change if corporate taxes were introduced into Widbergia. **(5 marks)**

Note. Your answer should address *both* theories of gearing. **(13 marks)**

6 THE MARINERS CO LTD

The Mariners Co Ltd is soon to be incorporated. Its promoters are considering five different possible capital structures for the new company. An analysis of comparable companies with equivalent business risks has been undertaken. This analysis shows that if the before-tax cost of debt is a constant 10% irrespective of the capital structure, then the cost of equity capital after corporation tax will be as follows.

Gearing ratio *(debt capital/total capital)* %	*Cost of equity capital* %
0	20.000
20.0	21.625
40.0	24.333
50.0	26.500
60.0	29.750

The above predictions for the equity cost of capital also assume that the earnings of the Mariners Co Ltd will be taxed at a rate of 21% and that the debt interest is an allowable expense for tax purposes.

The promoters expect that the company will generate a constant annual earnings stream before the payment of debt interest for the foreseeable future.

Requirements

(a) Calculate the effective after-tax weighted average cost of capital for each of the five possible capital structures, assuming that the before-tax annual cost of debt will be a constant 10% (irrespective of the capital structure chosen). **(5 marks)**

(b) Interpret the results of your calculations in (a) above and explain their significance in financial management. **(4 marks)**

(c) Discuss the possible consequences to a company of having a capital structure containing a high gearing ratio. **(11 marks)**

(20 marks)

7 ADAMS, PARLOUR & VIEIRA

Adams, Parlour & Vieira Ltd is a leading hotel group interested in expanding its activities. It is planning a new flagship hotel which will require an additional capital injection.

The potential cash inflows from this investment would be CU5m indefinitely from an initial investment of CU50m, CU25m of which would come from new debt finance – the balance from internal funds.

The company wishes to use the adjusted present value technique to determine the financial viability of the above.

Relevant information

(i) The company's existing WACC is 10.5%
(ii) The ungeared cost of capital for this sector is 11.06%
(iii) Taxation is currently at the rate of 21%
(iv) The loan to fund the investment will attract an interest rate of 8%

Requirements

(a) Calculate the Base Case NPV, the present value of the tax shield and therefore the adjusted present value of the proposed investment. **(4 marks)**

(b) What is the true WACC for the above project?

Explain why the company's existing WACC is not the appropriate discount rate. **(4 marks)**

(c) What are the shortcomings of the APV approach? **(4 marks)**

(12 marks)

8 QUIGLEY INDUSTRIES LTD

Quigley Industries Ltd is a listed manufacturer whose principal product is 'Qboard'. Qboard is widely used in the building trade, particularly in residential properties. The company has several manufacturing plants in Bangladesh. Qboard manufacture is a highly capital intensive activity. The company's other products, which account for only a small part of revenue are also supplied to the building trade.

Recently demand for Qboard has been very buoyant and the directors have decided to open a new manufacturing plant in Staffordshire to supply the local market and save on transport costs. A net present value assessment of the projected plant shows a substantial positive outcome. The cost of establishing this plant will be significant for the company, representing about 15% of its current stock market value.

The company is financed by a combination of equity and loan stock. Since the company's funds are all tied up in operations, establishing the new plant will require that the company raises additional finance. The directors generally have open minds on the source or sources of finance.

You are the company's finance director and have had some conversations with your colleagues, when the following points were made.

Director A

'This is not a good time to be issuing equity. I have a small share portfolio of my own and I plot the monthly prices of each share on graphs. I have done this for some years now and I can tell you that the patterns clearly show that we are heading for a major downturn in share prices. If we went for equity finance, by the time that we could get it organised the bear market would be with us and we would need to issue a large number of shares to raise the necessary cash.'

Director B

'We must pay attention to financial gearing. If we get that wrong, the stock market will probably savage our share price. By the way, are we going to make the financing decision without outside advice and are we going to handle the practicalities? If not, who is going to do it for us?'

Director C

'People only seem interested in equities these days; the evidence all shows that average returns are higher than you get from lending. We'll struggle to raise loan finance.'

Director D

'Everyone seems to be talking about external finance, but I'm not so sure that it's necessary. We make good profits and have done for some time; can't we use some of the retained earnings for this?'

Requirement

Draft notes for the directors, addressing the whole question of the financing decision, as well as picking up the points raised by the directors. The notes should use language that you expect the directors to understand and should explain any technical terms. **(18 marks)**

9 WEBCROFT LTD

Webcroft Ltd is a listed company that has a number of subsidiaries operating in the civil engineering sector. The company is currently financed by a mix of debt and equity and the company's current debt/equity ratio is expected to remain constant for the foreseeable future.

The finance director of Webcroft Ltd has been approached by the company accountant at one of its larger subsidiaries, Webplant Ltd, in connection with a potential investment of CU15m in a new cement pumping machine that would be rented out to construction companies.

The finance director has started work on a discounted cash flow analysis of this potential investment and is currently considering the rate at which to discount the estimated after-tax cash flows of the investment. The company accountant has suggested using the cost of the group's debt finance, as it has already been agreed with the parent company that if this investment were to proceed, it would be financed wholly by debt. However, the finance director is conscious that the company's normal policy is to use the weighted average cost of capital (WACC) as the discount factor in such calculations.

At the present time, the capital structure of the company comprises:

	CUm
180m CU0.50 ordinary shares	90
6.2% redeemable debenture stock	60
Revaluation reserve	36
Retained earnings	39

The company's ordinary shares are currently quoted at a price of 250p per share and the debenture stock has a market value of CU98 per CU100 nominal value. The prevailing corporation tax rate is 21% per annum and this rate is expected to be stable for the foreseeable future. The company recently paid a dividend of 20p per ordinary share. This compares with a dividend of 18.69p per share paid in the previous year and 17.47p per share paid the year before that. Interest on the redeemable debenture stock has also recently been paid. Annual interest payments are due at the end of each of the next three years and all of the debenture stock will be redeemed in cash at a 5% premium at the end of three years.

Requirements

(a) Calculate the company's WACC, detailing all your workings together with any assumptions you have made in your calculation. **(6 marks)**

(b) Explain to the company accountant any reservations the finance director might have with using:

(i) The cost of debt finance as a discount factor for this investment;

(ii) The weighted average cost of capital calculated in (a) as a discount factor for this investment. **(6 marks)**

(c) Describe the potential practical problems that might be encountered by a listed company such as Webcroft Ltd when calculating its weighted average cost of capital. **(4 marks)**

(d) Advise the finance director of the potential consequences, both in theory and practice, for the company's WACC if this new investment was financed in such a way as to increase the company's long-term debt/equity ratio above the industry average. **(4 marks)**

(20 marks)

10 BILL JACKSON HAULAGE LTD

Bill Jackson Haulage Ltd is a family-owned, unlisted company specialising in transporting bulk materials and waste, particularly for the local building trade, using its own fleet of lorries.

The company leases a site on which are located the company's lorry maintenance facility, a small office building and parking space for the lorries. The lease is shortly due to expire, and the landowner wishes to sell the site rather than renew the lease. A figure of about CU500,000 has been mentioned as a possible price for the freehold. This represents about 20% of the value of the company's total assets less current liabilities.

You are the partner in a local firm of chartered accountants responsible for the company's audit. You have been speaking to Paul Jackson, the company's chief executive, about the possible purchase of the site. During the conversation he said:

> 'We are very keen to buy this site. Land prices seem to rise pretty reliably round here, so there's not much chance of it turning out to be a bad move commercially. If we don't buy it, we don't know who will. It could be people who want to use it themselves, and then we would have to find a new site. If we buy it, a lot of uncertainty would be taken away.
>
> The problem is where would the cash come from? We haven't got any. We recently expanded our fleet of lorries and that took up all our spare funds and we had to borrow a bit from the bank as well.
>
> We could obviously borrow more – if we can find a lender, but we are not keen to overstretch ourselves. As I understand it, some borrowing is usually regarded as a good thing, though I'm not clear

why. There must be a limit on the amount of borrowing that is wise. What is the maximum figure for a company like ours?

Could you do us a short report on where we might get the cash, plus any related financial issues that you feel we ought to think about? I'd be grateful if you would keep it simple, so that we can understand it and discuss it among ourselves.'

Requirements

(a) Prepare the report requested by Paul Jackson. **(16 marks)**

(b) Critically comment on each of the following statements that have appeared in the press, explaining the reasons for your comments and clearly defining all technical terms used.

(i) 'A spin-off is a corporate restructuring device, where a company sells off a set of assets which constitute a definable part of its business to another business. The selling company's objective is usually to raise finance either for investment in its core activity or to stave off a financial crisis.' **(4 marks)**

(ii) 'Where there is 'hard' capital rationing, the business should seek to take on projects with the highest net present value.' **(4 marks)**

(24 marks)

Now go back to the Learning Objectives in the Introduction. If you are satisfied you have achieved these objectives, please tick them off.

Answers to Interactive questions

Answer to Interactive question 1

	No debt	CU800m debt	CU1,800m debt
	CUm	CUm	CUm
Profit before tax	100	60	10
Tax @ 21%	(21)	(12.6)	(2.1)
Dividends	79	47.4	7.9
Dividends + Interest to providers of finance	79	87.4	97.9
Cost to company			
Dividends	79	47.4	7.9
Interest × (1 – 0.21)	0	31.6	71.1
	79	79.0	79.0

The extra distributions arise because of the corporation tax savings on debt interest. For example, paying CU40m interest saves CU40m × 21% = CU8.4m tax (which is the difference between the tax bills of CU21m and CU12.6m in the first and second columns). This gives rise to the extra CU8.4m distributed (CU87.4m – CU79m).

The more highly geared a firm, the greater should be its total distributions.

Therefore the firm should become more valuable as gearing increases.

Answer to Interactive question 2

In highly-geared firms **managers** may find that the bulk of their time and attention is spent on keeping creditors happy, rather than on seeking the best course of action for the future prosperity of the firm. For example, it may make good financial sense to dispose of a **surplus asset** and use the funds to finance a profitable area of operations. However, if this means a loss of collateral for the creditors, much time can be wasted in persuading them to allow the asset to be sold. These operating problems will reduce the future cash flows of the business and hence its value.

Additionally, the firm may find that **key employees** leave rather than stay and risk being tainted by association with the bankrupt firm. **Suppliers** may refuse to deliver trading inventory, and **customers** may refuse to buy if they perceive a risk that the after-sales service will not be there. It may be necessary to liquidate non-current assets in order to finance working capital, thus entailing a reduction in the scale of operations. Parties with which the firm is contracted may renege on **contracts** if it is advantageous to them, knowing that the firm is not in a position to bring lengthy and expensive legal action.

Answer to Interactive question 3

Base case NPV

Time	*CUm*	*DF@12%*	*PV CUm*
0	(240)	1.00	(240)
1–10	40	5.65	226
			(14)

PV of tax shield

Interest pa = CU187.5m × 0.08 = CU15m

Time	*CUm*	*DF @ 8%*	*PV CUm*
1–10	15 × 0.21 = 3.15	6.710	21.1

Adjust for issue costs of CU1m.

APV = CU(14)m + CU21.1m + CU(1m) = CU6.1m

∴ project worthwhile overall (in fact project itself is no good, but financial benefit creates positive NPV).

Answer to Interactive question 4

(a) Find the systematic risk of the electronics industry – measured by β_a.

$$1.6 = \beta_a \left(1 + \frac{30(1-0.21)}{70}\right)$$

$\beta_a = 1.20$

($\therefore$ riskier than existing activities where $\beta_a = 1.15$ as no debt)

k_e $= 10\% + 1.20\ (25\% - 10\%)$

$= \underline{28\%}$

(= WACC as no debt)

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

k_e $= 10\% + 1.6\ (25\% - 10\%)$
$= 34\%$

k_d $= 10\%\ (1 - 0.21)$
$= 7.9\%$

WACC $= (34\% \times 0.7) + (7.9\% \times 0.3)$
$= \underline{26.2\%}$

(c) $\beta_a = 1.20$. Adjust to reflect new gearing.

ie β_e $= 1.20 \left(1 + \frac{40(1-0.21)}{60}\right)$

$= 1.832$

k_e $= 10\% + 1.832\ (25\% - 10\%)$
$= 37.48\%$

k_d $= 7.9\%$

WACC $= (37.48\% \times 0.6) + (7.9\% \times 0.4)$
$= 25.65\%$

Answers to Self-test

1 Financial risk is dependent on the debt/equity ratio: the higher its value the greater is the financial risk.

Operating risk is dependent on the ratio of variable costs to fixed costs: the higher its value the lower is the operating risk, due to the lower fluctuation of earnings as a percentage of sales.

2 If the company is financed (initially) in equal proportions by debt and equity, an increase in the tax rate reduces the value of the company, because there will be less in total to pay to investors, irrespective of the tax shield on debt interest.

3 The equity beta will be 1.06.

The market value of the company's equity is CU24 million.

Step 1 is to convert the current equity beta (β_g) into a beta for an identical all equity-company (β_a).

$\beta_a = \beta_g \times E/(E + D(1 - t))$
$\beta_a = 1.2 \times 24/(24 + 16\ (1 - 0.21)) = 0.79$

By raising CU4 million in equity to pay off debt, it has to be assumed that the company's equity shares will be worth CU28 million and the debt capital CU12 million.

At this new gearing level, the equity beta (β_g) will be:

$\beta_g = \beta_a /[E/(E + D\ (1 - t))]$
$\beta_g = 0.79/[28/(28 + 12\ (1 - 0.21))] = 1.057$, say 1.06

4 The adjusted present value of the project is CU2,000,000 to the nearest CU100,000

Step 1

Calculate NPV as if the company were all-equity financed. Here the cost of capital will be 13%. Loan issue costs will be considered later.

Year		Cash flow	Discount factor at 13%	PV
		CU'000		CU'000
0		(7,500)	1.000	(7,500)
1–3	Post tax (5,000 × 0.79) =	3,950	2.361	9,326
				1,826

Step 2

Calculate the PV of the tax shield provided by the loan interest, discounting the tax reliefs at the pre-tax cost of interest (Assumption: tax shields are just as risky as the interest payments that generate them.)

Year	Interest	Tax shields	Discount factor at 10%	PV
	CU'000	CU'000		CU'000
1	750	158	0.909	143.6
2	500	105	0.826	86.7
3	250	53	0.751	39.8
				270.1

Step 3

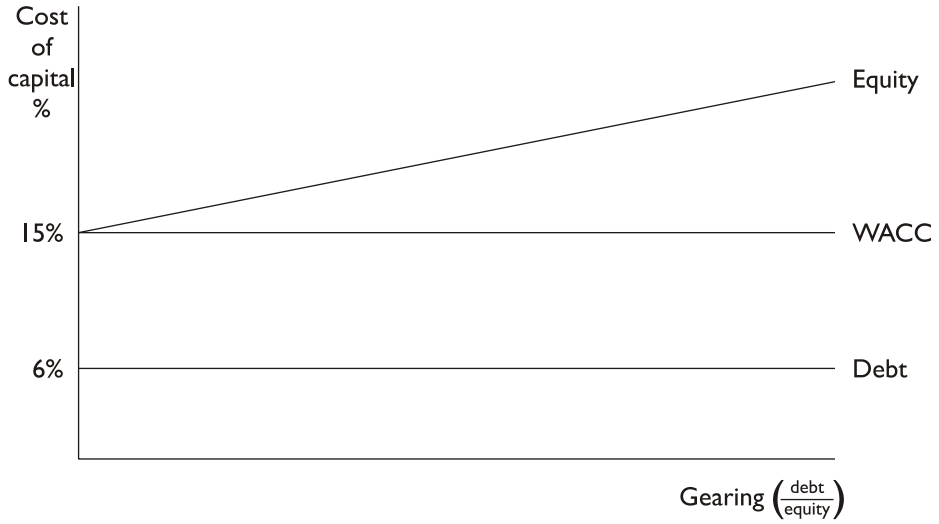
	CU'000
NPV of project if all equity financed	1,826.0
PV of tax shield due to loan interest	270.1
Loan issue costs	(100.0)
APV	1,996.1

5 SORINA LTD

(a) **Mr Brush**

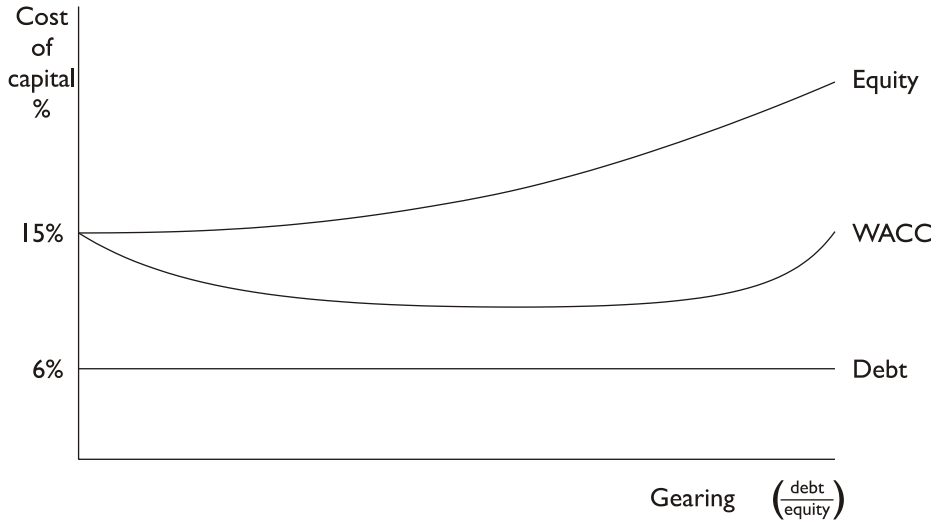
The data collected by Mr Brush supports Modigliani and Miller's (M&M) theory of gearing (see below). This states that, in the absence of taxation, a company's weighted average cost of capital (WACC) depends only on the risk of that company's earnings (ie the level of business or earnings risk). In particular the WACC of a company in these circumstances is independent of its capital structure.

If one accepts these results, then Sorina Ltd would always be faced with a WACC equal to its present WACC of 15%. The downward effect of issuing cheaper debt finance (at 6%) on the WACC will always, as predicted by M&M, be counteracted by an equal and opposite rise in the cost of equity. This can be illustrated as follows for Sorina Ltd.



Consequently the discount rate that should be used for project appraisal is the WACC of 15%. This assumes that the projects to be appraised will carry the same business risk as that from the existing operations of Sorina Ltd.

As an alternative to the above analysis, it is also necessary to consider briefly the implications of the traditional theory of gearing. This is best illustrated in its results by the following diagram.



Under the traditional theory of gearing the initial rise in equity as gearing increases is initially outweighed in the WACC calculation by the introduction of cheaper debt finance. Eventually this effect is reversed and, with the influence of bankruptcy risk (see below), even the cost of debt rises at high levels of gearing. The overall effect is to produce a WACC that, for some optimal level of gearing, is a minimum.

If the data collected by Mr Brush is consistent with M&M purely by chance (ie the traditional theory is that which actually describes the relationship between WACC and gearing), then Sorina Ltd should issue sufficient debt to attain its optimal gearing level (ie lowest WACC). At optimal gearing the associated minimum WACC will be an appropriate discount rate for investment appraisal.

WORKINGS

Company P = Cost of equity $= \frac{12}{100}$

$= 0.12$, or 12%

Company Q = Cost of equity $= \frac{36}{200}$

$= 0.18$, or 18%

Cost of debt = 6% (= return to debt holders)

WACC $= \frac{1 \times 18\% + 1 \times 6\%}{2}$

= 12%

Company R = Cost of equity $= \frac{24}{150}$

= 0.16, or 16%

Company S = Cost of equity $= \frac{58}{300}$

= 0.1933, or 19 1/3%

Cost of debt = 6%

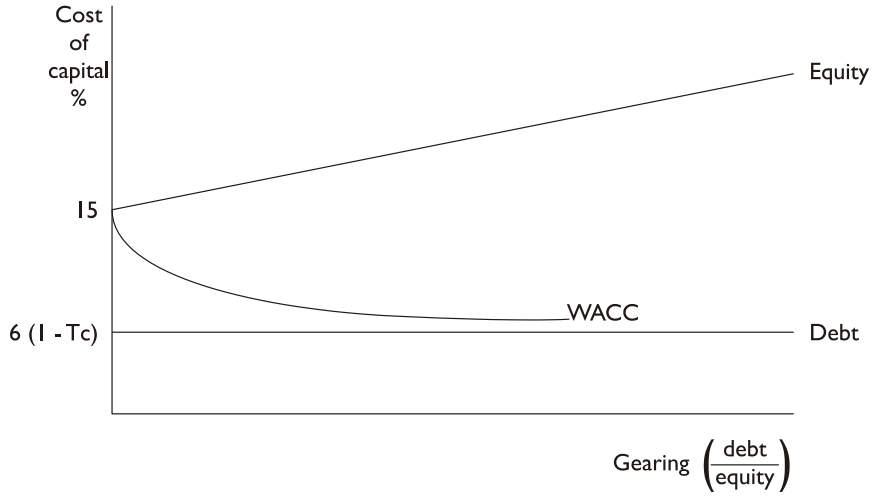
WACC $= \frac{3 \times 19\frac{1}{3} + 1 \times 6}{4}$

= 16%

(b) **Corporate taxes**

If corporate taxes are introduced the effect is to produce a cost of debt that is lower than the 6% return required by the providers of debt finance. This is on the assumption that companies in Widbergia can set interest payments against profits for the purpose of computing tax, thus obtaining tax relief on such payments.

M&M predict that the effect on WACC will be as indicated below.



It can be seen that any increase in gearing will produce a lower WACC. Thus, if one accepts M&M's hypothesis with corporation tax, Sorina Ltd would seek to gear as highly as possible (in practice investors will set an upper limit on borrowing). An appropriate discount rate for project appraisal would be the WACC at the highest gearing level.

Considering the traditional theory of gearing with corporation tax, the effect of tax on the cost of debt is as described above. However, this will not change the basic result of the traditional theory (i.e. that there exists an optimal level of gearing) and again the minimum WACC will be used as a discount rate.

6 THE MARINERS CO LTD

(a) **Weighted average costs of capital**

At the various levels of gearing the weighted average cost of capital of Mariners will be as follows. The after-tax cost of debt is 10% (1 – 0.21) = 7.9%.

$\frac{D}{D+E}$		k
%		%
0		20
20	$(0.8 \times 21.625) + (0.2 \times 7.9)$	18.88
40	$(0.6 \times 24.333) + (0.4 \times 7.9)$	17.76
50	$(0.5 \times 26.5) + (0.5 \times 7.9)$	17.20
60	$(0.4 \times 29.75) + (0.6 \times 7.9)$	16.64

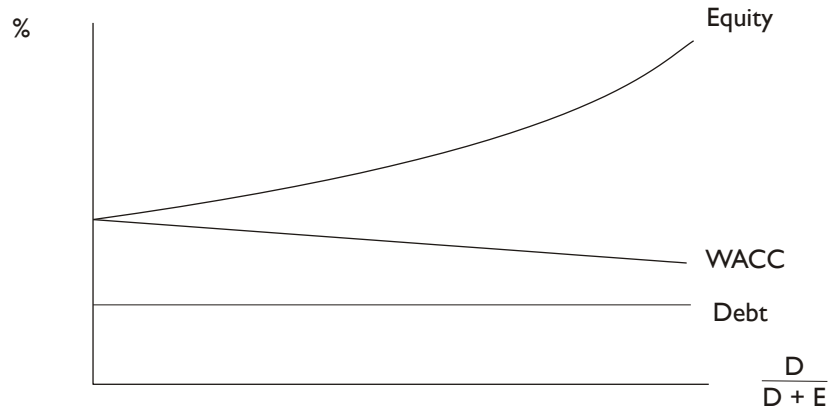
(b) **The significance of the results**

The implication of part (a) is that k falls continuously as the gearing ratio increases.

This is consistent with M&M's 1963 propositions on gearing.

The relationship between k and $\frac{D}{D+E}$ may be shown graphically as follows.

Modigliani & Miller's 'with-tax' hypothesis



In turn this analysis suggests that the optimal capital structure in a taxed world is 99.9% debt.

Whether this contention is true is a vexed issue. Both M&M's 1958 article, which argued that there was no optimal capital structure but assumed no corporation tax, and their 1963 correction to allow for corporate taxes, are at variance with the traditional view. The debate regarding the effects of gearing on the weighted average cost of capital is essentially empirical. However, the empirical evidence is inconclusive and the argument continues. What is not in dispute, however, is that, whatever its theoretical merits, the M&M with-tax position is not accepted by the majority of financial managers in practice. Companies with 99.9% gearing ratios are fairly thin on the ground!

(c) **Possible consequences of a high gearing ratio**

As was seen in parts (a) and (b) above, the introduction of corporation tax with debt interest as an allowable expense for tax purposes caused M&M to modify their original proposition that k is independent of the debt/equity ratio. Instead, they conclude that k is a continuously declining function of gearing and therefore that the total value of the firm is maximised where the gearing ratio is 99.9%. They conclude that the value of the firm is equal to

$V_s = V_u + DT$

ie the value of a geared company is the value if it were all equity financed plus the present value of the tax shield (the tax relief from debt interest payments). This conclusion is intuitively unacceptable and is certainly not accepted by the majority of practising financial managers. It is now necessary to consider possible weaknesses in the analysis to discover why most firms do not have extremely high debt/equity ratios.

First, the numerical analysis carried out in (a) assumes a constant cost of debt that is unaffected by the level of gearing. This is unrealistic. At very high gearing levels the suppliers of debt will be bearing most of the company's risk. In the extreme case of 100% debt, the entire risk of the business is borne by the debenture holders and therefore k_d must equal k_e (the cost of equity of an ungeared company). It seems likely that k_d will rise as gearing reaches high levels, and therefore it cannot be assumed that k will decrease continuously and linearly.

Secondly, the analysis concentrates entirely on the effects on the company's tax bill. Ultimately the value of the firm must be determined by the present value of the after-tax receipts of the providers of capital, both debt and equity investors. M&M advocate increasing the gearing ratio, ie paying the company's earnings to its investors in the form of debt interest rather than dividends. The rationale for this is that there are beneficial consequences for the company's tax liability. However, as has been argued above, the real concern should be with the total tax, both personal and corporate, paid on the company's earnings. While making returns to loan stock may have advantages with respect to the company's tax liability, there could be personal tax advantages in ensuring that earnings are distributed in the form of returns to equity.

In the first place, the advantages of loan interest payments rather than dividend payments are reduced by any tax credit that accompanies dividend payments. Secondly, returns to equity may be in the form of capital gains rather than income, giving the opportunity to utilise the annual exemption on capital gains. A final consideration under the general heading of tax effects is to recognise that the tax advantages of high gearing depend on the existence of a corporate tax liability. Low profitability and large capital allowances may combine to ensure that the tax advantages are reduced, if not eliminated.

Apart from the tax effects there is a further consequence of high gearing, and that is the risk of bankruptcy. Brealey and Myers argue that the total value of a geared company is its value if all-equity financed, plus the present value of the tax shield, less the present value of financial distress. This last term includes the extreme case of bankruptcy, but also includes other financial costs short of bankruptcy. Among these are conflicts between equity and debt holders which may result in poor operating and investment decisions.

Costs of bankruptcy include direct costs such as court fees and the need to sell assets at below their value because of the forced sale, and indirect costs associated with managing a company which is undergoing a reorganisation. The present value of these costs of financial distress is the cost multiplied by the probability that they will be incurred. Clearly, this probability increases as the debt/equity ratio increases, and the eventual cost may well outweigh the tax advantages.

A number of other factors which are more difficult to quantify may also account for the observed reluctance of most companies to adopt very high gearing levels. First, suppliers may be more reluctant to extend credit to very highly geared companies. Secondly, potential customers may be concerned at the risk of bankruptcy implied by high gearing.

This would obviously affect industrial consumers placing long-run contracts which are inevitably concerned with continuity of supplies. It may also have an effect in the consumer durables industry, where concern about the ability of manufacturers to honour guarantees could reflect the demand for their products. Finally, it is possible that company managers may be worried about the increased risk of redundancy and leave the company as a result. This could have disadvantageous effects on the caliber and morale of the company's staff.

In summary, companies with very high gearing ratios may gain tax advantages in terms of their corporate tax liability. However, these advantages may be restricted by the availability of taxable profits. Furthermore, it is the total taxes paid on corporate earnings, ie both personal and corporate taxes, that are really relevant and there may be personal tax advantages from distributing earnings in the form of returns to equity rather than debt, as well as other, less quantifiable costs. These include, but are not restricted to, corporate bankruptcy. It is possible that the costs of financial distress may outweigh the tax advantages associated with high gearing levels.

7 ADAMS, PARLOUR & VIEIRA

(a) k_{eu} = 11.06% Base case NPV = –CU50m + CU5m × 1/0.1106 = –CU4.79m

The present value of the tax shield

interest paid per annum = CU25m × 8% = CU2m

tax relief per annum = CU2m × 21% = CU0.42m

present value of the tax relief (discounted @ cost of debt) = CU0.42m × 1/0.08 = CU5.25m

APV = –CU4.79m + CU5.25m = CU0.46m

(b) The company's existing WACC is not appropriate because it reflects the existing capital structure of the company. An increase in gearing will cause it to change. What it will change to is not clear cut. Modigliani and Miller (M & M) argued that in a taxed world – the cost of capital would fall down to the tax shield on debt interest. There is a limit to how far this effect will be observed however. The traditional view is that very high increases in gearing will cause the WACC to rise. In any event, in a taxed world, a change in gearing is likely to mean the existing WACC is not relevant.

(c) The APV approach is based on the assumptions underpinning M & M's view on capital structure.

These do not necessarily fully reflect the practical aspects of raising capital such as

- Agency costs
- Financial distress costs

8 QUIGLEY INDUSTRIES LTD

Financing and other issues relating to a major investment

- **Gearing**

Quigley Industries Ltd (QI) is operating in a classic cyclical industry, with high capital intensity and, almost certainly, high operating gearing. Operating profits are susceptible to great fluctuations in the face of fluctuations in revenue. History shows this trade to be subject to such fluctuations.

Financial gearing must therefore be approached with caution. Identifying the optimal level of gearing seems very difficult to achieve. It can only be a matter of judgement, but forming that judgement must take account of QI's current level of gearing and of levels of gearing in the industry, particularly with market leaders and with companies having high operating gearing, such as QI.

In theory (Modigliani and Miller) gearing makes no difference to the wealth of the shareholders: cheap loan finance has a positive effect that is precisely cancelled out by the higher returns required by shareholders in the face of higher risk. If we take account of the tax deductibility of loan interest, gearing in theory favours shareholders since, in effect, there is a transfer of wealth from the tax authorities to shareholders.

At higher levels of gearing the risk of the company being unable to meet its debt commitments of interest and capital repayment, particularly during a period of low revenue/operating profitability, could force the company to liquidate, to the detriment of shareholders' wealth (Director B's comment). Gearing policy tends, therefore, to be seen as striking a balance between the benefits of tax relief and the potential costs of 'bankruptcy'.

Other factors that could come into play

- **Agency**

Directors may be unwilling to gear the company up to a level optimum to the shareholders. This is because gearing imposes a set of disciplines on the directors, ie of having to meet interest payments and arranging continuing finance when the loan is due for redemption.

- **Signalling**

It is believed by some that a company making a loan issue implies confidence in the future, and this could have a favourable effect on the share price.

- **Clientele effect**

It is believed that particular shareholders are attracted to the shares of a particular company, because of the level of gearing. Altering the level of gearing could have a detrimental effect on the share price as investors move away from the company to a "preferred habitat". Uncertainty about the company's intentions could also have a detrimental effect.

A large positive NPV project, such as the new plant, will affect gearing, since it will add value to the equity of the company.

Equity

This is an obvious source of finance, subject to the gearing level. The most obvious source of equity is a rights issue to existing shareholders. This has the advantage of being relatively cheap to issue and does not face the company with much of a problem regarding the issue price. There is normally a right that existing shareholders are offered new shares before a public issue can be made. Usually the shareholders would need to vote away their "pre-emption" rights, before the company could go for a public issue.

A public issue is much more expensive than a rights issue to achieve, because there are legally-required, expensive procedures to be met. Public issues tend to be more likely to fail. Setting prices for public issues tends to be difficult to judge.

Equity is rather more expensive to QI than loan finance: investors expect higher returns than they do for loans, but their returns are distinctly more risky. (Director C's comment). Equities seem popular at present.

Loan finance

Whether a loan stock issue to the public or a term loan from a financial institution, loan finance is relatively cheap to raise relative to equity. Lenders typically expect good security, and freehold land tends to offer the best security. So the ability of QI is likely to be linked to the extent that it has unused "debt capacity" in its assets.

Lenders typically expect lower returns than equity holders, but they have contractual rights to interest and redemption payments on the due dates. This exposes the company to risk and to discipline.

Provided that the company has sufficient taxable profits, loan interest is tax deductible and this makes it still cheaper for the company.

Retained earnings

This is an important source of new finance to Bangladeshi companies. It would not be suitable in this case, since all of the company's available funds are already committed. There is the option of waiting, perhaps a few years, until retained earnings build up before making the investment, but commercially this may not be a real option.

The revenue reserves are not cash, but part of the owners' claim. Therefore they are not available as investment funds (Director D's comment).

Retaining profit has implications for dividend policy and, possibly, for shareholder wealth.

Market efficiency

The evidence is clear, that in sophisticated stock markets charted price patterns do not repeat themselves, except by chance. Weak form efficiency is present in such markets.

It is illogical to feel that a time of low share prices is a bad time to issue new shares. Market efficiency theory (and evidence) suggests that whatever the share price is at any point represents the best unbiased estimate of its worth based on available evidence (Director A's comment).

Other sources

- Leasing the plant
- Sales and leaseback
- Working capital efficiencies
- Possibility of grants from public funds

Advice

It is possible that QI has sufficient 'in-house' expertise to enable it to avoid the need for professional advice. Raising the level of finance that we are probably considering here is not an everyday event for a commercial company, so it is probably better to seek advice from experts.

Merchant banks typically are able to offer advice and may well be able to put the company in touch with potential investors, assuming that the rights-issue route is not taken.

The larger firms of chartered accountants, almost certainly QI's auditors, have close links to corporate finance advisors.

The advice will not typically be cheap (Director B's comment).

9 WEBCROFT LTD

(a) $1 + g = \sqrt{20 / 17.47} = 1.07$ $g = 7\%$

$k_e = D_1/P + g = 20(1.07)/250 + 0.07 = 0.1556 = 15.56\%$

k_d = IRR of the relevant cash flows, as follows:

T	Transaction	CF	5%df	PV	10%df	PV
0	Ex-int MV	(98)	1	(98)	1	(98)
1-3	Interest	6.2	2.723	16.88	2.487	15.42
3	Redemption price	105	0.864	90.72	0.751	78.86
				9.60		(3.72)

Pre-tax $k_d = 5 + 9.6/(9.6 + 3.72) \times (10 - 5) = 8.60\%$
Post-tax $k_d = 8.60 \times (1 - 0.21) = 6.79\%$

WACC

$((180m \times 2.50 \times 15.56\%) + (60m \times 98\% \times 6.79\%))/((180m \times 2.50) + (60m \times 98\%)) = 14.55\%$

The assumptions made in undertaking this calculation are as follows:

1 The validity of the dividend valuation model is assumed.

2 The current share price is correct (the result of an efficient market) and is not in any way being distorted by short-term factors.

3 The tax rate will, indeed, prove stable at 21% per annum.

4 Interest on the debenture stock remains tax deductible.

5 The past growth rate in dividends will be continued in future.

6 The future growth rate in dividends will be constant.

(b) (i) The reservations that might attach to using the cost of debt finance alone as a discount factor in appraising this investment are that firms should not usually discount investment returns at the cost of debt simply because it is being financed mainly with debt. In the long run, the firm would undoubtedly need to raise additional equity in order to balance the debt finance raised for this particular investment, given that the stated intention is to leave the current debt/equity ratio intact, and the cost of the overall funds should, therefore, be considered. Only when a particular source of finance is very much project specific should the accountant's recommendation be considered valid.

(ii) The reservations that might attach to using the WACC calculated in (a) as a discount factor in appraising this investment are that WACC is only suitable if the investment being considered maintains the company's historical proportions of debt and equity by market value; maintains the company's overall business and financial risk; and if new debt can be issued at the same cost as the existing redeemable debenture stock. Only if the finance director is satisfied that these underlying assumptions will hold (ie. that the new investment will not alter the existing WACC) should the WACC be considered suitable as a discount factor. These conditions can be relaxed if the proposed investment is considered small/marginal relative to the company's overall size, as small/marginal investments are unlikely to impact on the company's business or financial risk.

(c) The potential practical problems that might be encountered by a company such as Webcroft Ltd when calculating its WACC are:

1 The validity of the model may be called into question. The estimated cost of equity is based on the assumption that the value of an ordinary share is the discounted present value of the future dividend stream, but if the market is using a different valuation method model e.g. CAPM, the calculation would be undermined.

2 There are numerous practical problems in estimating the various variables in the model – is the average dividend growth rate meaningful given that it is a past figure? The share price is subject to daily fluctuations, potentially involving great volatility.

3 A firm of this size may well have other sources of finance which can pose problems for incorporating into an accurate WACC calculation – for example, unlisted preference shares, convertible loan stock, loans denominated in foreign currency, off-balance sheet financing items and short-term debt such as overdrafts, which although classified as short-term may well constitute a long-term source of financing for the company.

(d) The traditional theory of gearing would suggest that if the company is currently at or above its optimal gearing level, then if gearing were to increase, the WACC would also increase. However, if the company is not yet at its optimal gearing level and the increase in the debt/equity ratio moves it either closer to or up to that optimal gearing level, then the WACC would fall (due primarily to the effects of the tax shield attaching to debt interest).

Modigliani & Miller, however, theorised that in the presence of corporation tax, firms should gear up as much as possible as the tax shield means that the WACC would fall as gearing rose.

However, in practice the precise impact on the company's WACC would depend on market reaction. An increase in gearing, *per se*, need not necessarily be viewed as negative by the market (for the theoretical reasons stated above), but an increase in gearing to a level in excess of the industry average is more than likely to increase the perceived risk of the company and therefore will increase the WACC by increasing both the cost of debt and the cost of equity.

10 BILL JACKSON HAULAGE LTD

(a) **REPORT**

To: Paul Jackson, Chief Executive of Bill Jackson Haulage Ltd (BJH)
From: J Gray, Black, White and Gray, Chartered Accountants
Date: 13 June 20X2
Subject: Financing the purchase of the company's site

Terms of reference

To advise on possible sources of finance for the purchase of the freehold of the company's site

General points

Before proceeding with plans to purchase the site the directors must be confident that purchasing the current site represents the best prospect. Moving to an alternative site, whether leased or bought, may provide an economically preferable option. If such a site exists, a net present value assessment should be made of the options.

Irrespective of other sites the directors must be confident that purchase of the site at the price expected represents an economically viable prospect. In simple terms, can BJH afford this site, given the use to which it will be put?

Financing

General points

Broadly, financing sources fall into two categories; equity and debt. A question arises about the extent to use debt, which tends to be (or appears to be) cheaper. For most businesses, debt is relatively cheap because interest payments attract tax relief. It also seems cheaper because interest rates tend to be lower than the level of returns expected by shareholders. This is because lenders' returns are less risky than those of shareholders.

Ignoring tax for a moment, as soon as a business starts to borrow (has capital gearing) the returns of shareholders become more risky because they have the additional burden of legally enforceable interest payments. It has been shown that the net effect on the shareholders of borrowing is zero. Debt is cheaper but this benefit is precisely countered by the higher returns expected by shareholders because of the additional risk.

Thus tax is the only reason that debt is cheaper. This is significant because it represents a 21% discount on the cost of debt. From this it might appear that businesses should raise all or almost all of their finance from borrowing. This is not practical for one main reason: there is the danger that the business would not be able to meet its interest or loan redemption obligations, leading to the loan creditors forcing it into liquidation (bankruptcy). This can be very costly to the shareholders because it tends to lead to assets being sold off for much less than they are worth to the shareholders on a 'going concern' basis.

Thus a balance needs to be struck between taking advantage of tax relief and avoiding the costs of bankruptcy. Where this balance lies is very difficult to say and, in practice, a matter of managerial judgement.

Factors that tend to be involved include the following.

- Whether the business has sufficient profits to take advantage of tax relief on interest payments – not a problem with BJH
- Whether the business can provide security, normally in the form of suitable assets – probably not a problem for BJH with the lorries and the land itself
- The type of assets that the business owns – if they tend to have relatively high realisable values, bankruptcy cost would be less

- The extent to which revenues fluctuate – high gearing is not consistent with fluctuating profits; much of your business comes from the building trade, which tends to have peaks and troughs of demand
- The level of operating gearing (fixed costs to total costs) – high operating gearing leads to profit fluctuations which capital gearing would add to; a business like BJH tends to have relatively high fixed costs
- The attitude of the shareholders – if they are prepared to take more risk for higher rewards, higher capital gearing may be appropriate.

For your size of business CU500,000 is a large loan. On the other hand, you are presently paying rent which I presume is commensurate with prospective interest payments, with broadly the same implications, ie failure to pay implies eviction from the site. Borrowing to buy the site would lower your operating gearing, but increase your capital gearing.

Sources of finance

Equity

New issue

The most obvious source of equity is a rights issue to existing shareholders. This has the advantage of being relatively cheap to issue and does not provide the company with much of a problem regarding the issue price. A key issue here is the extent to which the shareholders have the funds necessary to take up new shares. They may also lack willingness to make further investment in the company. On the other hand, they will see the company's problem and may be prepared to help if they can.

Normally, equity is rather more expensive to the company than debt; investors expect higher returns than for debt, but their returns are distinctly more risky. This tends to be less of an issue with a private company.

It is possible that the directors would consider taking the company public. There are companies as small as this listed on the Alternative Investment Market (AIM), but this is very much at the lower end. For this size of company the fixed costs of an AIM listing are very high. Moreover, the potential loss of control, together with the exposure to public scrutiny associated with an AIM listing, would probably not be welcome to the company.

A more fruitful area for an equity issue might be a business angel or a venture capitalist. Such investors tend to need the prospect of high returns and an exit route for their investment. This means that such investors are interested only in expanding companies that can be foreseen to be likely to be taken over or to go public within a reasonable time.

Retained earnings

This is an important source of new finance to many companies, but it is slow. It would not be suitable in this case, since all of the company's available funds are already committed. There is the option of waiting, perhaps a few years, until retained earnings build up before making the investment but, commercially, this may not be realistic.

Retaining profit normally has implications for dividend policy and, possibly, for shareholder wealth, but this too may not be a big issue for this company.

Term loan from a bank or similar institution

Your bank may well be prepared to lend you the money, or to put you in touch with another lender. My firm has corporate finance contacts, which may be able to advise, if necessary.

A term loan tends to be tailored to the needs of the borrower. It may involve partial repayment of the principal (the amount borrowed) with interest payments over the period of the loan (like a repayment mortgage) or interest only payments until the loan is due to be repaid. Term loans tend to be very cheap to negotiate.

Interest rates tend to be low where there is good security, which there would be in this case where the site value would provide a good basis. Lenders would tend to want a margin of safety, so would be reluctant to lend CU500,000 on the security of an asset costing that much. It may be that other assets could also be pledged as security, or that other sources (see below) could reduce the amount required.

It is not unusual for lenders to impose covenants or restrictions on the borrower, eg insisting that it maintains a particular current assets/current liabilities ratio.

This type of finance looks as if it may be the most appropriate for BJH and should be seriously considered.

Loan stocks

In theory this is a possibility but, for a small family company, it is probably not very practical. Probably the main benefit of loan stocks is their transferability, but without a listing this is probably not an issue.

Working capital

It may well be worth assessing whether there is any scope for generating some cash from the company's working capital. For example, might it be possible for you to reduce trade receivables and/or increase trade payables? There is clearly little scope with inventory since you hold very little. Anything that you can obtain from working capital, provided that you are prudent, would have little or no cost. The amounts involved here would certainly not make great inroads on CU500,000, but it might be worth considering.

Unused non-current assets

Are there any assets that you do not use or are not used profitably? If there are, and they could be sold, cash could be generated. As with working capital, any cash sourced from here would be relatively little.

(b) (i) **Critical comments on the spin-off statement**

The statement is comprehensively wrong. A spin-off occurs where a company takes a definable part of its activities and places it in another, subsidiary company. It then hands out the shares in the subsidiary to the members of the original company *pro rata* their shareholding in the latter. Usually a stock exchange listing is obtained for the new, spun-off company.

The reasons for doing this are typically twofold.

- A desire to give the spun-off company its own distinct identity, which might enhance overall shareholder value.
- To avoid a takeover attempt for the whole company, by making the spun-off element more expensive.

Thus no new finance is raised and there is no effective change in ownership of any of the assets of the original company.

What is described in the quote is a 'sell-off'.

(ii) **Critical comments on the capital rationing statement**

Capital rationing is a situation where a company does not have sufficient funds to make all of the investments that have a positive NPV, when discounted at the investors' opportunity cost of capital.

The capital restriction may arise from the company's inability to raise funds in the market, so-called 'hard' capital rationing. (A company-imposed restriction on the amount of investment finance available to managers, say, at divisional level is known as 'soft' capital rationing.)

In principle, selecting investments on the basis of the highest NPV per CU of investment finance (not necessarily the highest NPV projects) will lead to the maximum generation of shareholder wealth.

CHAPTER 7

Equity sources and dividend policy

Introduction

Examination context

Topic List

1 The classic view of the irrelevance of the source of equity finance

2 M&M and dividend policy

3 Share buy-backs and scrip dividends

Summary and Self-test

Answers to Interactive questions

Answers to Self-test

Introduction

Learning objectives

Tick off

- To explain why in theory the source of equity finance is irrelevant in determining shareholder wealth ☐
- To explain the practical limitations of the theory on raising equity ☐
- To explain the theoretical and practical issues surrounding the dividend decision ☐

Syllabus references relevant to this chapter are 1b, f, m.

Syllabus links

This subject follows on from the chapters on sources of finance and gearing.

Examination context

You may be asked to evaluate the implications of different dividend policies in the exam.

You may also be expected to explore the implications of raising equity finance from a variety of sources.

1 The classic view of the irrelevance of the source of equity finance

Section overview

- The cost of the equity finance is the same, irrespective of whether the equity is new shares, a rights issue or retained profits.
- Pricing new issues – too high and it may not succeed, too low and it will cause too much dilution.

1.1 The M & M view

This view was developed by Modigliani and Miller, whose views are regarded as the classic position. Their argument is that all sources of equity finance have the same cost, and therefore that the particular source of equity finance is irrelevant.

It has been seen already that the cost of equity finance represents the returns required on equity funds invested. If this level of return is not obtained, share prices will fall until the implied return on equity equals the shareholders' required rate of return. This argument applies to all sources of equity.

For example; $k_e = \frac{D_0}{P_0}$

If returns to investors ie dividends fall, then the value of the share price will fall. This results in the required rate of returns (k_e) being maintained at the required level.

1.2 The irrelevance argument demonstrated

If both new equity and retained earnings have the same cost, then it should be irrelevant, in terms of shareholder wealth, where equity funds are found. This is demonstrated in the following illustration:

Worked example: Irrelevance argument

Zeus Ltd is an equity financed company. It has in issue 5,000,000 shares. These are currently quoted at CU5.50 each cum-div. The dividend proposed for the current year is 50p per share. No increase in this dividend is anticipated unless new projects are accepted. There is no long-term debt.

The company's cost of equity (k_e) is 10%.

One such project is currently under consideration. This project would involve investing CU500,000 immediately. It would generate a cash surplus of CU100,000 in one year's time and annually thereafter in perpetuity. The project cash flows are known to the market, and do not alter the company's risk. All of the project cash flows would be paid as dividends.

The NPV of the project is (CU500,000) + CU100,000/0.1 = CU500,000

You are asked to evaluate three alternative sources of finance from the point of view of the existing shareholders:

(a) A reduction in the current year's dividend to 40p per share, so as to release CU500,000 of internally-generated funds

(b) A rights issue on a one-for-ten basis at CU1 per share

(c) A new issue of shares. These would be identical to existing ordinary shares and would first rank for dividend in one year's time.

Ignore taxation and issue costs.

Solution

Impact of the new project and related finance.

	CU million	
Current ex-div value of shares = 5 million x CU5.00	25	
NPV of the project	0.5	
Increase in equity capital	0.5	
Ex-div value of shares afterwards	26	million

Alternative working:

Existing dividend = CU0.5 x 5m = CU2.5m

Increased dividend = CU0.1m

$$P = \frac{D_1}{k_e} = \frac{CU2.5m + CU0.1m}{0.1} = CU26m$$

This will be the ex-div value of the equity irrespective of how the money is raised. The cum-div value will obviously be affected if some of the dividend is retained, but the wealth of the shareholders will not be.

(a) **Retained earnings**

(CUmillions)		Ex-div value	+ Dividend =	Cum-div value	
Before:		25	2.5	27.5	
Capital: using dividend		0.5	(0.5)		Increase in shareholder wealth is CU0.5m, being NPV of project.
Project outlay:	(0.5)				
PV (inflow)	1.0				
NPV Project		0.5			
		26m	+ 2.0m	= 28m	

(b) **Rights issue**

		Ex-div value	+ Dividend =	Cum-div value	
Before:		25	2.5	27.5	Increase in shareholder wealth is:
					Increase in value of equity CU1.0m
Capital:		0.5			Less: cost of new shares CU(0.5m)
Project outlay	(0.5)				CU0.5m
PV (inflow)	1.0				
NPV Project		0.5			
		26	2.5	28.5	

In conclusion, the change in shareholders' wealth is the same, irrespective of how the new capital is injected.

(c) **New share issue**

While the wealth of the shareholders in total is unaffected by the source of the new equity, the way that wealth is divided between the shareholders is influenced by the price chosen. The company therefore needs to consider carefully the asking price per share.

If these new shareholders are allowed to enter the company too cheaply, the increased number of shares will detract from the wealth of existing shareholders; if priced too highly they will refuse to subscribe.

If all of the gain is to go to the existing shareholders the ex-div value of their 5m shares must be CU25.5m after accepting the project ie CU5.10 each. If the company wants to set a price of CU5.10, they will need to issue CU500,000 ÷ CU5.10 = 98,039 new shares.

Taking into account the NPV of the subsequent project, the value of the shares would change as follows.

Issuing new shares at a price of CU5.10

	Shares	Price	Value of shares
		CU	CU
Amount issued	98,039	5.10	500,000
Currently in existence	5,000,000	5.00	25,000,000
			25,500,000
NPV of project			500,000
	5,098,039	5.10	26,000,000

The combined value of the shares would be CU26 million (as illustrated above). This would be shared over the 5,098,039 shares to give a share price of CU5.10.

				Gain
Amount issued	98,039	5.10	500,000	nil
Currently in existence	5,000,000	5.10	25,500,000	500,000
				500,000

Once all shares have moved to the equilibrium price of CU5.10, it can be seen that all of the gain has in fact gone to the existing shareholders.

Considering another illustration: if the company set an issue price of only CU5, the number of shares issued would have to rise ie 100,000 new shares issued. Taking into account the NPV, the value of the shares is again CU26m, but this time with a share price of CU5.098 (CU26 million/5.1 million shares).

Issuing new shares at a price of CU5.00

	Shares	Price	Value of shares
		CU	CU
Amount issued	100,000	5	500,000
Currently in existence	5,000,000	5	25,000,000
			25,500,000
NPV of project			500,000
	5,100,000	5.098	26,000,000

Once all of the shares have moved to an equilibrium price of CU5.098, the gain of CU500,000 due to the NPV is shared between existing and new shareholders.

				Gain
Amount issued	100,000	5.098	509,804	9,804
Currently in existence	5,000,000	5.098	25,490,196	490,196
				500,000

In conclusion, the share price set for a new issue determines how the wealth is shared, but not the amount of the wealth, which is unaffected.

Summary of overall position.

Description	Retained earnings		Rights issue		New share issue (assuming a price of CU5.10)	
	CUm	CUm	CUm	CUm	CUm	CUm
Original value of equity cum-div 5m × CU5.50		27.5		27.5		27.5
Ex-div value of original equity with scheme and project	26.0		26.0		25.5	

Proposed dividend	2.0	2.5	2.5
Cum-div value	28.0	28.5	28.0
Less investment to buy rights	–	(0.5)	–
	28.0	28.0	28.0
Net gain to existing	0.5	0.5	0.5

Conclusion

From the above illustration it is concluded that strict application of the dividend valuation approach indicates that the source of equity finance is irrelevant. This is because whichever way the finance is provided, equity shareholders require a return of 10% per annum.

Note that in all cases the increase in total shareholder wealth equals the NPV of the project.

1.3 Pricing of new issues

One of the most difficult problems in making a new issue to the public is setting the price correctly. If it is too high, the issue will not be fully taken up and will be left with the underwriters. This will reflect badly on the company and on the issuing house.

The solution may be to under-price the new issue. However, this works to the detriment of the existing shareholders.

Interactive question 1: Pricing of new issues

[Difficulty level: Exam standard]

Using the data in the worked example, calculate the following:

(a) The gain to the existing shareholders if the new shares are issued at CU4 each
(b) The issue price at which the existing shareholders neither gain nor lose.

(a) To find the gain, use this approach:

- Find the number of shares

- Find the value per share afterwards

- Compare to the value before (or cost of shares for new shareholders)

(b) For the existing shareholders to make no gain, the share price afterwards must remain at CU5.

See **Answer** at the end of this chapter.

- The total gain remains constant at CU500,000. The change is the sharing of that gain between new and old shareholders
- What you should have demonstrated is that if new shares are issued at a very low price, then more of the gain of CU500,000 accrues to the new shareholders
- Whereas if the price is set at high, then more of the gain goes to the existing shareholders. This presumes however that the new shares will be sold at a high price – which may not occur
- Almost inevitably, the price would have to be below the existing market price for the issue to be subscribed

A rights issue completely bypasses the price problem. Since the shares are offered to existing shareholders, it does not matter if the price is well below the traded price. Indeed, it would be normal for this to be so. Although there would be a gain on the new shares, by the nature of a rights issue this would go to the existing shareholders.

1.4 Practicalities of raising equity finance

The above analysis and conclusions must be considered in the light of the practicalities of raising equity. As discussed in the chapter on sources of finance, new equity issues, including rights issues, are expensive and time consuming – a very important practical point that results in retained profits being a much more frequent source of equity finance.

1.5 Pecking order

It has been suggested that because of issue costs firms try to access equity finance in a particular sequence, ie they follow a 'pecking order'. Note that the first worked example in this chapter, Irrelevance argument, assumes that issuing shares is costless. The order in which equity funds are supposedly used is as follows:

- **Retained earnings** are usually the cheapest source of finance as they involve no issue costs. However, if they are used too extensively the result can be a substantial cut in dividends, which will upset shareholders, depress the share price and drive up the cost of equity
- **Rights issues and placings** are the next cheapest form of equity finance due to the relatively low issue costs
- **New issues** to the public tend to be the most expensive source of equity finance.

2 M&M and dividend policy

Section overview

- In theory, dividend policy is irrelevant in determining shareholder wealth.
- There are a number of practical issues that need to be considered when paying out dividends.
- Shares can be given *in lieu* of dividends.

2.1 The theory

Modigliani and Miller (M&M) proposed that in theory the **pattern of dividends** over time is irrelevant in determining shareholder wealth.

If the source of equity finance is irrelevant (retentions or new issues) then dividend policy must also be irrelevant. This means that paying or not paying a dividend does not matter, provided a firm takes on all available positive NPV projects such that shareholders' wealth is maximised.

M&M are *not* saying dividends themselves are irrelevant (after all the value of a share is the present value of the dividend stream) but they are saying that the *pattern* of payments (ie the dividend policy) is irrelevant.

Interactive question 2: Dividend policy [Difficulty level: Easy]

Consider a firm paying a 10p dividend each year with a cost of equity of 10%.

If the firm could invest in a project which meant cancelling the 10p dividend in one year and investing it for one year at the cost of equity, what would happen to shareholder wealth?

See **Answer** at the end of this chapter.

While the dividends themselves are important, the *pattern* of payment is not. Obviously shareholders would prefer positive NPV investments.

M&M went on to argue that only after a firm has invested in all positive NPV projects should a dividend be paid if there are funds remaining, ie retentions should be used for project finance with dividends as a residual. Given their assumptions, M&M are right. It is a matter of whether these assumptions hold in the real world.

2.2 Arguments for the relevance of dividend policy

Traditional theory/resolution of uncertainty

In the example in section 1 above, the use of retained earnings involves sacrificing current income (dividends) in order to increase wealth through a higher share value, ie a capital gain. Traditionalists would argue that CU1 of dividend income received now is more certain than CU1 of capital gain (the so called **'bird in the hand'** approach). Greater value would be put on a firm paying a dividend (and issuing shares to finance new investments) than one using retentions (ie cutting dividends).

Essentially this implies that cost of equity increases with time, ie later cash flows should be discounted at a higher rate than earlier cash flows. In fact, rather than being related to time, risk is related to the nature of the project which produces the cash flows. So, as long as an appropriate risk-adjusted rate is used, there is no need to value earlier cash flows more highly than later cash flows**. The resolution of uncertainty argument is, therefore, fallacious.**

2.3 Dividend signalling

In reality investors do not have perfect information concerning the future prospects of the company. Many authorities claim, therefore, that the pattern of dividend payments is a key consideration on the part of investors when estimating future performance. For example, an increase in dividends would signal greater confidence in the future by managers and would lead investors to increase their estimate of future earnings, and cause a rise in share prices. A sudden dividend cut on the other hand would usually have a serious effect upon equity value, as estimates of future dividend flows are also cut.

This argument implies that **dividend policy is relevant**. Firms should attempt to adopt a stable (and rising) dividend pay-out to maintain investors' confidence.

Note that if dividends do convey information, this is evidence **against strong form market efficiency** because it implies that information exists which is not already incorporated into the share price.

2.4 Clientele

Investors may be attracted to firms by their dividend policies. This might be because high pay-outs attract those who prefer current income or low payments attract those with high marginal income tax rates. Low pay-outs may also attract those seeking capital gains, eg pension funds which must meet long-term pension commitments as well as short term pension payments.

Major changes in dividend policy should be avoided if possible as these might upset particular clientele who sell their shares, pushing down the share price. While new clientele may find the new policy attractive and buy shares, the overall climate of uncertainty as to what is the long-term dividend policy could have a depressing effect on the share price.

2.4.1 Preference for current income

Many investors require cash dividends to finance current consumption. This does not only apply to individual investors needing cash to live on, but also to institutional investors, such as pension funds and insurance companies, which require regular cash inflows from *some* of their share investments to meet day-to-day outgoings, such as pension payments and insurance claims. This implies that many shareholders will prefer companies which pay regular cash dividends and will therefore value their shares more highly.

Modigliani and Miller challenged this argument and claimed that investors requiring cash can generate 'home-made dividends' by selling shares. This argument has some attractions but it ignores transaction costs. The sale of shares involves brokerage costs and can therefore be unattractive to many investors. Also, some investors, such as trusts, are not allowed to spend out of capital; only income may be used for consumption.

2.4.2 Taxation

Income and capital gains are taxed differently in Bangladesh (eg gains are taxed at a flat rate subject to an annual exemption). It is not the place of this manual to examine tax in depth. Suffice it to say that there may be a preference for income or capital gains depending on the investor's tax position.

2.5 Cash

If cash is unavailable to pay a dividend (perhaps because positive NPV projects exist which, if invested in, leave cash unavailable for dividends), either the planned investment should be cut back or money borrowed if it is felt that payment of a dividend is necessary to avoid adverse signalling effects.

2.6 Agency theory

As has been seen in earlier chapters, managers/directors do not necessarily act in the best interests of shareholders. Shareholders can keep some control over their money by insisting on high pay-out ratios. If managers/directors want new funds for investment, they are forced to issue shares (by rights issue or to the public) and *justify* why the investment is sound. Obviously, managers/directors would prefer to use retentions in this instance.

The agency cost is represented by the cost of the new share issue.

Even if managers are allowed to use retentions for investment (with correspondingly lower pay-outs), there may still be an agency cost for shareholders in that managers may invest in 'empire building' projects, rather than in those which increase shareholder wealth.

3 Share buy-backs and scrip dividends

Section overview

- Companies repurchase shares if they want to return large amounts of capital to shareholders.
- Companies offer shares *in lieu* of dividends.

3.1 Share repurchases

As an alternative to dividend payments a company might consider using the cash to repurchase issued shares (reducing equity and increasing gearing).

Buy-backs also enable a company to use surplus cash without disturbing the normal dividend policy. If surplus cash were used to increase the dividend this might be treated over-favourably by the market, expecting higher dividends/growth in future which is not sustainable. An alternative to buying back shares would be to pay a 'special dividend' making it clear that it was a one-off above normal sustainable levels, thus sending the right signal to shareholders.

The repurchase may be achieved by buying shares in the stock market, or inviting shareholders to tender their shares, or by arrangement with particular shareholders. Repurchases are subject to the Companies Act and the rules of the Stock Exchange.

3.2 Stock (or scrip) dividends

Companies may offer scrip dividends (ie shares) *in lieu* of cash dividends.

Worked example: Stock dividends

Jack Ltd has 100,000 shares issued valued at CU1.10 cum-div per share. The market expects Jack Ltd to pay a dividend of 10p per share in the near future.

Jack Ltd is considering the following options:

(1) Pay the dividend of 10p per share.

(2) Cancel the cash dividend and substitute a 1-for-10 scrip dividend.

(3) Offer a choice of cash (10p) or scrip (1-for-10).

(4) Offer a choice of cash (10p) or enhanced scrip (1-for-8).

Requirement

Calculate the effect on wealth of each of the above options on a shareholder with 1,000 shares (for (3) and (4) assume 90% of shareholders take the scrip alternative).

Solution

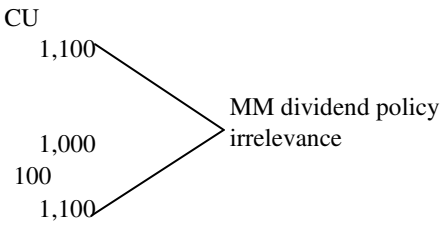
(1)

Wealth before = 1,000 × CU1.10

New share price = CU1.00 ex-div

∴MV shares = 1,000 × CU1.00

Cash received = 1,000 × CU0.10



(2) Number of shares issued = 10,000

Total value of shares = CU110,000 as no cash paid out

∴New share price $= \frac{\text{CU}110,000}{110,000}$

= CU1.00 ex-div

Shareholder now has 1,100 shares, ∴wealth

1,100 × CU1.00 = CU1,100

∴No difference from conventional dividend (ie dividend policy irrelevance).

(3) 10% of shareholders take cash, ∴cash paid = 10,000 × 10p

= CU1,000

∴New MV of shares = CU(110,000 – 1,000)

= CU109,000

90% of shareholders take scrip, ∴ number of shares issued $= 90,000 \times \frac{1}{10}$

= 9,000

∴New share price $= \frac{\text{CU}109,000}{109,000}$

= CU1.00 ex div

Therefore

	CU
Wealth of shareholder who took cash	
1,000 shares @ CU1.00	1,000
Cash	100
	1,100
Wealth of shareholder who took scrip	
1,100 shares @ CU1	1,100

Thus, ignoring tax effects etc, shareholder should be indifferent between no dividend, cash dividend and scrip dividend (dividend policy irrelevance).

Note

Option (3) the choice, only works because the terms of the dividend and scrip were such that, in isolation, they resulted in the same share price.

(4) New MV = CU109,000 (as (3))

New number of shares $= 100{,}000 + 90{,}000 \times \frac{1}{8}$

$= 111{,}250$

$\therefore$ Price $= \frac{\text{CU } 109{,}000}{111{,}250}$

$= \text{CU}0.97978$

Therefore

	CU
Wealth of shareholder who takes cash 1,000 × CU0.97978	979.78
Dividend	100.00
	1,079.78
Wealth of shareholder who takes scrip 1,125 × CU0.97978	1,102.00

$\therefore$ Shareholder taking enhanced scrip is better off (ignoring tax).

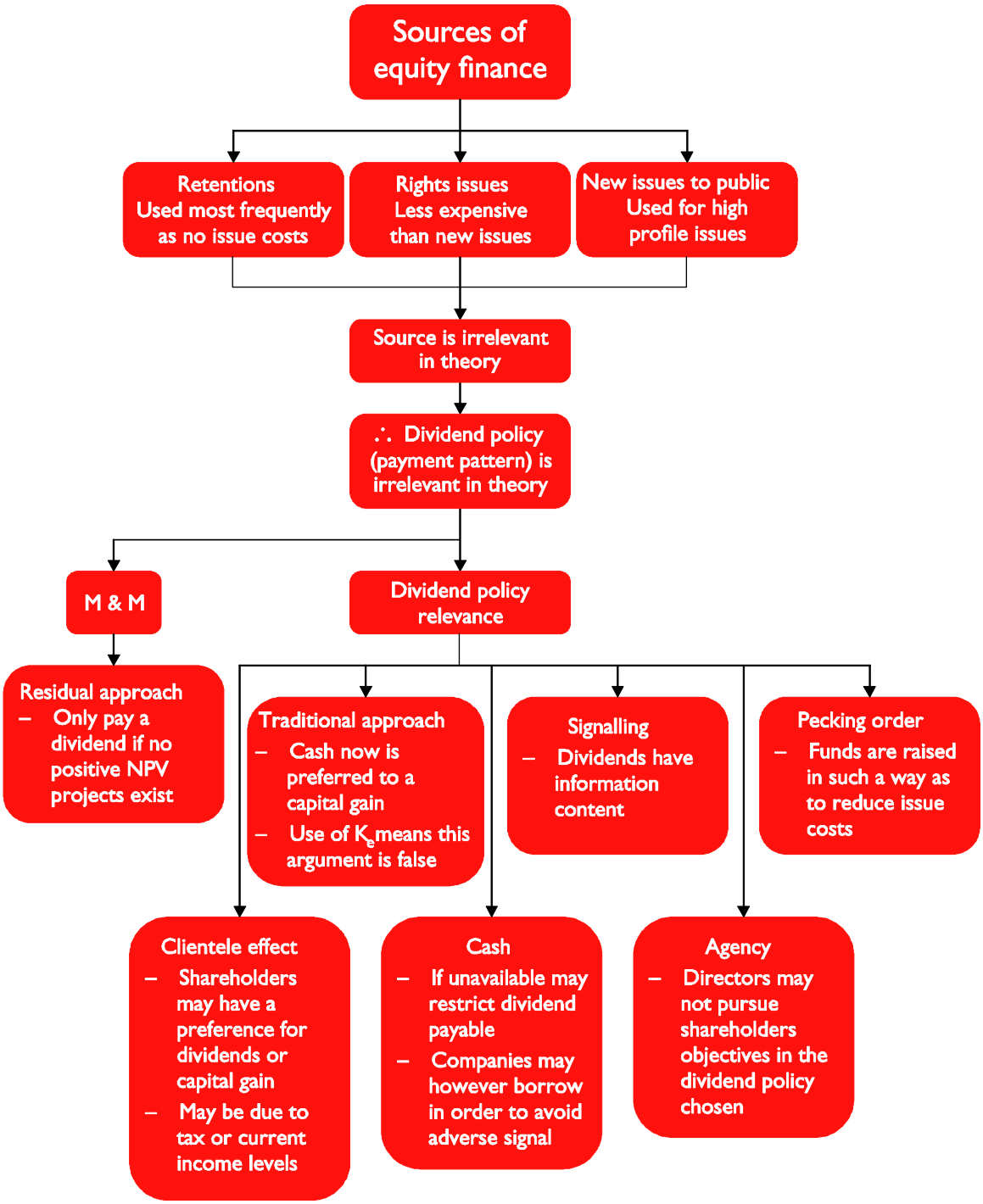
Advantages of scrips

With normal scrip ((2) and (3) above)	With enhanced scrip ((4) above)
• Company avoids liquidity problems	• Company avoids liquidity problems
• Shareholder swaps income for capital gain and may be better off (depends on their income and capital gains tax position)	• Shareholder swaps income for larger capital gain (if < 100% take enhanced scrip) and may be better off (depends on tax position)

3.3 Conclusions on dividend policy

M & M are probably right, despite their assumptions. Evidence suggests that share value and dividend policy are not closely related. But evidence also points to a clientele effect. Perhaps the best a firm can do is establish a dividend policy and stick with it. Many listed firms opt for a stable, rising dividend per share. Dividends are set at a level below anticipated earnings to provide for new investment (thus avoiding the need for too many expensive share issues) and to allow the dividend to be maintained if there is a sudden, temporary fall in earnings. Any earnings in excess of normal dividend requirements and beyond those required for investment could be returned to shareholders via one-off special dividend payments or used to repurchase the firm's shares.

Summary


Sources of equity finance
Retentions
Used most frequently as no issue costs
Rights issues
Less expensive than new issues
New issues to public
Used for high profile issues
Source is irrelevant in theory
∴ Dividend policy (payment pattern) is irrelevant in theory
M & M
Dividend policy relevance
Residual approach
– Only pay a dividend if no positive NPV projects exist
Traditional approach
– Cash now is preferred to a capital gain
– Use of K_e means this argument is false
Signalling
– Dividends have information content
Pecking order
– Funds are raised in such a way as to reduce issue costs
Clientele effect
– Shareholders may have a preference for dividends or capital gain
– May be due to tax or current income levels
Cash
– If unavailable may restrict dividend payable
– Companies may however borrow in order to avoid adverse signal
Agency
– Directors may not pursue shareholders objectives in the dividend policy chosen

Self-test

Answer the following questions.

1 JETHRO LTD

Jethro Ltd has an issued share capital of 5 million ordinary shares, on which it has paid annual dividends of 80p per share for several years. The company has no plans for expansion, and the stock market generally expects dividends to continue at that level. The market price per share is CU5.80 cum-dividend. The company has no fixed interest capital.

The directors are considering the acceptance of a new capital project which would require an immediate outlay of CU700,000. If the project were accepted, it is estimated that it would generate net cash receipts of CU140,000 per annum indefinitely (starting in one year's time). Those additional receipts would be used to increase dividends.

The directors are considering two possible ways of using shareholders' funds in order to finance the new project.

(1) A rights issue of 1 new share for every 25 shares held at present at a price of CU3.50 per share. The new shares would rank for dividend one year after issue.

(2) An issue of shares to the general public. The new shares would rank for dividend one year after issue.

Assume that, if the project were accepted, the firm's expectations of future results would be discovered and believed by the stock market, and that the market would perceive the risk of the firm to be unaltered.

Requirements

(a) Estimate the ex-dividend price per share if the project is financed by the rights issue, and calculate the gain made by shareholders.

(b) Estimate the gains made by present shareholders and new shareholders if the new shares in option (2) are issued at CU4.00 each.

(c) Calculate the price at which the new shares should be issued under option (2) if the total benefit of the project is to go to existing shareholders.

(d) Discuss the practical differences between retained earnings, rights issues and new issues to the public as sources of equity finance.

Note: Ignore taxation and issue costs for parts (a) to (c), but not (d). **(15 marks)**

2 STRONTIUM LTD

Strontium Ltd has an issued share capital of 1 million ordinary shares of CU1 each and no fixed interest securities. It has just paid a dividend of 60p per share. Dividends have recently been increasing at the rate of 5% per annum, and shareholders generally believe that this rate of dividend growth will continue indefinitely. The market price is CU6.30 per share.

The company is now considering an investment proposal which would require an initial outlay of CU600,000 and would generate net cash receipts for the following three years of CU300,000, CU500,000 and CU300,000 respectively. These additional receipts will be used to increase dividends.

The cash for the initial outlay will be raised by means of a rights issue with issue costs of CU20,000. Assume that if the project were accepted the firm's expectations of future results would be discovered and believed by the stock market.

Requirements

(a) Estimate the market capitalisation of Strontium's ordinary shares once the rights issue has been made and the project has been accepted. **(4 marks)**

(b) Calculate the gain made by the shareholders in total as a result of accepting the project.

(3 marks)

(c) Calculate the net present value of the project after subtracting issue costs. **(3 marks)**

(d) The rights issue in the above example will take one of the following forms.

(i) A 1 for 10 issue at CU6.20.

(ii) A 1 for 5 issue at CU3.10.

In each case calculate the gain made by the holder of 100 shares who takes up his rights. Assume issue costs are the same under both options. **(5 marks)**

(e) (i) If the rights issue were 1 for 5 at CU3.10, at what price should a shareholder who does not wish to take up the offer hope to sell his rights, if he is still to make his full share of the gain on the project?

(ii) Calculate the gain made by the holder of 100 shares who sells his rights at this price. **(4 marks)**

(f) What is the minimum price at which the shareholder should sell his rights if he is not to make a loss? **(3 marks)**

(22 marks)

3 SOUTHERN INDUSTRIAL SERVICES LTD

Southern Industrial Services Ltd is an all equity financed, Stock Exchange listed company. Over recent years the company's management has adopted a fairly cautious and conservative policy of not seeking expansion, but has been content to earn a steady level of profits, most of which have been distributed as dividends.

Recently there have been some personnel changes at board level with the result that the company has more actively been seeking new investment opportunities. In the financial year which has just ended the company reported profits of CU5 million, a similar figure to that of recent years.

It has been estimated that the company's cost of equity is 15% per annum.

Four investment projects have been identified, all of which could commence immediately. The estimated cash flows and timings of these projects are as follows.

Project		*A*	*B*	*C*	*D*
		CUm	CUm	CUm	CUm
Year	0	(2.00)	(2.00)	(3.00)	(1.00)
	1	0.75	0.65	0.80	0.50
	2	0.75	0.65	0.80	0.50
	3	0.75	0.65	0.80	0.50
	4		0.65	0.80	
	5		0.65	0.80	

Each of these projects is in the same risk class as the company's existing projects.

You have been asked by the board to give your advice on dividend policy at next week's board meeting.

Requirements

(a) Calculate how much Southern Industrial Services Ltd should pay to shareholders as a dividend in respect of the company's financial year which has just ended, assuming that Modigliani and Miller were correct in their original 1961 proposition on dividend policy.

You should ignore taxation in this calculation. **(5 marks)**

(b) Prepare notes on which you will base your contribution to the board meeting. These should include a brief explanation of the Modigliani and Miller proposition on dividend policy and reasons why the company's board may decide not to pay the level of dividend which you indicated in (a). You should bear in mind the fact that most members of the board have little or no accounting or financial knowledge. Your comments must relate to the particular circumstances of Southern Industrial Services Ltd. **(8 marks)**

Ignore inflation.

Work to the nearest CU1,000. **(13 marks)**

4 MILLER SHARP LTD

Miller Sharp Ltd is a Stock Exchange listed company which had operated in two main areas of business – the manufacture of agricultural supplies and the manufacture of furniture, both for the Bangladesh market. Recently, however, it sold its furniture-making activity for a cash amount equal to about 30% of Miller Sharp's market capitalisation. This was done in order to concentrate on what the directors see as the company's core activity in agricultural supplies. Since the directors can see no investment opportunities, a decision has been made to use the cash to restructure the company's finances. Three possibilities have been proposed.

(1) Purchase and cancel some of the company's loan stock.
(2) Purchase and cancel some of the ordinary shares.
(3) Pay a 'special' dividend.

Some combination of two or all of these possibilities might be acceptable to the directors.

When the directors met to discuss the use of the cash in one or more of the ways mentioned above, the following comments were made.

> The finance director –'We've always been modest dividend payers in the past, so our shareholders would probably welcome a large dividend.'
>
> The production director – 'This is a good opportunity to get rid of some of the loan stock burden and push up our share price.'
>
> The marketing director – 'I feel that it would be better to hold on to the cash; redeeming capital in this way will make us look weak and adversely affect the share price. Instead of redeeming some of the shares, why don't we make a bonus issue and so give the shareholders a share of the reserves in that way.'

The directors are to meet next week to make a final decision on precisely how the cash is to be used. The chief executive has consulted you on the matter.

Requirement

Make notes for the chief executive in advance of next week's meeting on what you consider to be the arguments for and against each of the options or any combination of options.

(16 marks)

5 TRB

You have been asked for advice by a relative who has raised a number of points, based on articles he has read recently in his newspaper. Here is a summary of his points:

> Firstly, I read a piece about a marketing agency, Tollard, Royle, Berwick Ltd (TRB), which has been going through a bad patch and had been in negotiations with its long term creditors to restructure its debts. Accordingly, it had agreed to sell off parts of the business and issue some more ordinary shares. However, it has just lost a key customer to a competitor. This hasn't had much of an effect on its equity value as TRB is generally well regarded in its industry and has high quality staff and clients. However, its key lenders have taken fright and have sold their TRB debentures via an intermediary to Mayo Allen Ltd (Mayo) a multinational agency, dominant in TRB's market. Mayo is now in a position to take control of TRB, even though it owns no ordinary shares in the company. How can this be? I've always thought that the ordinary shareholders were the key players.
>
> Secondly, there has been a lot of coverage in the financial press recently about shareholders' concerns over the levels of dividends being paid by their companies. I thought I'd read somewhere (or perhaps you told me a while back) that the dividend payments are irrelevant. What's the situation here?

Requirement

Prepare answers to your relative's questions. **(10 marks)**

Now go back to the Learning Objectives in the Introduction. If you are satisfied you have achieved these objectives, please tick them off.

Answers to Interactive questions

Answer to Interactive question 1

(a) Number of new shares issued = $\frac{£\text{CU}\,),000}{£\text{CU}}$ = 125,000

Once trading begins the total value of *all* shares ex-div will be as follows:

$$\frac{\text{Total dividends}}{k_e} = \frac{\text{CU}(2.5\text{m} + 100{,}000)}{0.1} = \text{CU26m}$$

Ex-div price per share = $\frac{£\text{CU}\,\text{m}}{5.125\text{m}}$ = CU5.0732

	CU'000
Gain made by existing shareholders	
5m × CU0.0732 (CU5.0732 less current CU5 ex-div)	366
Gain made by new shareholders	
125,000 × CU1.0732 (CU5.0732 less CU4 cost)	134
Total gain	500

Thus, the total gain remains the same (ie the NPV of the project) but the new shareholders receive, in effect, a windfall gain by investing in the new company.

(b) For the existing shareholders to make no gain, the ex-div price must remain at CU5.

Total shares in issue $= \frac{\text{CU}\,26\text{m}}{\text{CU}\,5}$ = 5.2m

Number of new shares issued = (5.2 – 5)m = 0.2m

Issue price $= \frac{\text{CU}\,500{,}000}{200{,}000}$ = CU2.50

Gain to new shareholders = 200,000 × CU(5 – 2.5)
= CU500,000

Answer to Interactive question 2

The original ex-div value is:

$$\frac{10\text{p}}{1.1} + \frac{10\text{p}}{1.1^2} + \frac{10\text{p}}{1.1^3} + \ldots \text{ etc}$$

or more simply (as it is a perpetuity):

$$\frac{10\text{p}}{0.1} = \text{CU1}$$

Paying an extra 11p of dividend one year later (nothing else changed), the present value would be:

$$\frac{0\text{p}}{1.1} + \frac{10\text{p} + 11\text{p}}{1.1^2} + \frac{10\text{p}}{1.1^3} + \ldots \text{ etc}$$

As the 10p dividend in one year has been reinvested at the shareholders' required rate of return (10%) to earn 10p × 1.1 = 11p one year later, there is no increase in wealth ie zero NPV and the present value of this new stream must still be CU1.

Answers to Self-test

1 JETHRO LTD

Initial workings

(1)

	CU
Present market value per share cum-dividend	5.80
Less: current dividend	(0.80)
Market price ex-dividend	5.00

(2) Shareholders' required rate of return $= \frac{\text{CU}0.80}{\text{CU}5.00}$

$= 0.16 \text{ or } 16\%$

(3)

	CU
Existing annual dividends (80p × 5,000,000)	4,000,000
Add: net cash receipts from project	140,000
Revised annual dividend estimate from t1 onwards	4,140,000

(4) Revised market capitalisation of company, ex-dividend, after accepting project

$$\frac{\text{CU}4,140,000}{0.16} = \text{CU}25,875,000$$

This figure is the same regardless of the method of equity finance used.

Note: The shareholders' required rate of return has remained at 16% because the risk of the firm is perceived to be unaltered.

(a) **Rights issue and shareholder gains**

Number of shares issued $= \frac{1}{25} \times 5,000,000$

$= 200,000$

New market price ex-dividend $= \frac{\text{CU}25,875,000}{5,200,000}$

$= \text{CU}4.976$

	CU'000
New ex-div market capitalisation 5,200,000 × CU4.976 (subject to rounding)	25,875
Original ex-dividend market capitalisation 5,000,000 × CU5.00	(25,000)
Increase	875
Less: cash subscribed on issue 200,000 × CU3.50	(700)
Net gain made	175
The gain made equals the NPV of the project at 16%, ie	175,000

(b) **Public issue at CU4.00**

Number of shares issued = CU700,000 ÷ 4
= 175,000

Total shares after issue = 5,175,000

Ex-dividend market value of company = CU25,875,000

Market value per share after issue ex-dividend $= \frac{\text{CU } 25,875,000}{5,175,000}$

= CU5

The present shareholders make no gain or loss. Their shares were originally quoted at CU5 ex-dividend and remain at that figure after the issue.

The new shareholders make a gain of CU1 per share, a total gain of:

175,000 × CU1 = CU175,000

(c) **New issue price**

There are various ways of solving this part of the question.

If the new shareholders are to make no gain, their share value will settle at the price of CU700,000.

	CU
Value of whole company ex-dividend	25,875,000
Less value of new shares	(700,000)
New value of original shares	25,175,000

There are 5,000,000 original shares. Therefore, new value per share is

$\frac{\text{CU } 25,175,000}{5,000,000}$ = CU5.035

New shares should be issued at CU5.035

They will then show no gain.

Gain made by existing shareholders = CU0.035 × 5,000,000
= CU175,000 = NPV of project

(d) **Practical differences between the three sources of finance**

(1) Various transactions costs are involved with the options. The retention of earnings is costless, whereas the issue of shares can cost a significant amount, particularly when issued to the general public. This would make retentions preferable.

A further transaction cost of importance is that of the shareholder selling shares. If he has a consumption preference such that he requires cash now, he may prefer a dividend to a capital gain resulting from retention and reinvestment in projects, since to realise the latter he will have to sell shares which will involve brokerage.

(2) Taxation is different depending on whether the company finances itself by retained earnings, or pays full dividends and raises money by share issue.

From the individual's point of view dividends are subject to income tax which may be at a higher rate than the basic rate.

Capital gains are likely to be taxed at a flat rate subject to the annual exemption, but payment can be deferred until the sale of the equity.

(3) Imperfect information available to investors will have an important effect. As regards the issue of shares to the public, it would not be possible in general to sell shares at their theoretical maximum price, since investors may not feel confident that the firm will earn the predicted returns. Of course, this could work in the opposite way if investors overestimate the value of the company.

Imperfect information also has an impact on retentions. In theory this should not affect a firm's value but the dividend is frequently taken as a signal of how the firm is expected to perform. Thus a drop in dividend could well depress share prices below their 'true value'.

In general the 'imperfections' stack up in favour of financing by retained earnings, provided this does not have adverse consequences for the market. This is borne out by the real world in which over 95% of investment using equity shareholders' funds is financed by retained earnings.

2 STRONTIUM LTD

(a) **Market capitalisation**

$$\text{Cost of equity shares} = \frac{0.60 \times 1.05}{6.30} + 0.05$$

$$= 0.15 \text{ or } 15\%$$

	CU'000
PV of future dividends without the project (ie MV)	6,300
Add PV of extra cash receipts used to increase dividends	
Year 1 CU300,000 × 0.870	261
Year 2 CU500,000 × 0.756	378
Year 3 CU300,000 × 0.658	197
PV of dividends with project accepted	7,136

Thus the market capitalisation of the company rises to CU7,136,000.

(b) Shareholders' gain

	CU'000
Market capitalisation with project	7,136
Market capitalisation without project	(6,300)
	836
Less cash subscribed for rights issue	(620)
Gains made by shareholders	216

(c) Net present value of project

	Cash flow CU'000	Discount factor @ 15%	PV CU'000
Year 0	(620)	1.000	(620)
Year 1	300	0.870	261
Year 2	500	0.756	378
Year 3	300	0.658	197
NPV			216

(Gains made by shareholders = NPV of project.)

(d) Shareholder's gain, taking up rights

(i) Value of company after project accepted = CU7,136,000

Number of shares in issue = 1.1 million

$$\text{Price per share after rights issue} = \frac{\text{CU } 7{,}136{,}000}{1.1\text{m}}$$

= CU6.4873

Effect on holder of 100 shares

	CU
Value of shareholding after issue 110 × CU6.4873	713.60
Value of shareholding before issue 100 × CU6.30	(630.00)
Increase in shareholding value	83.60
Cash subscribed for issue 10 × CU6.20	(62.00)
Gain made	21.60

(ii) Value of company after project accepted = CU7,136,000

Number of shares in issue = 1.2 million

Price per share after rights issue = CU5.9467

Effect on holder of 100 shares

	CU
Value of shareholding after issue 120 × CU5.9467	713.60
Value of shareholding before issue 100 × CU6.30	(630.00)
	83.60

Cash subscribed 20 × CU3.10	(62.00)
Gain made	21.60

(e) Price of rights

(i) The shareholder should hope to sell his rights for the difference between the rights price and the share's final value, ie

CU(5.9467 – 3.10) = CU2.8467

(ii) Effect on holder of 100 shares

	CU
Value of shareholding after issue 100 × CU5.9467	594.67
Value of shareholding before issue 100 × CU6.30	((630.00)
Decrease in value of shareholding	(35.33)
Cash from sale of rights 20 × CU2.8467	56.93
Net gain	21.60

(f) **Minimum price of rights**

If the shareholder is not to make a loss, he must recover CU35.33 from the sale of the rights.

The rights should therefore be sold for $\frac{£\text{CU}\,33}{20}$ each, ie CU1.7665 each.

3 SOUTHERN INDUSTRIAL SERVICES LTD

(a) **Net present value of projects**

A	= – 2m + (0.75m × 2.283)	= –CU0.288m
B	= – 2m + (0.65m × 3.352)	= CU0.179m
C	= – 3m + (0.8m × 3.352)	= –CU0.318m
D	= – 1m + (0.5m × 2.283)	= CU0.142m

As there is sufficient capital to undertake all positive NPV projects, the company should invest in B and D and use CU3m.

The dividend under the Modigliani and Miller policy is the residue, ie CU5m – CU3m = CU2m. It could also be argued that under M&M's assumptions any dividend would do, as shortfalls of cash could be replaced by new equity issues.

(b) **Notes for board meeting**

(i) **Modigliani and Miller proposition**

M&M suggested that, under the assumption of a perfect capital market, the dividend valuation model would give the share price exactly. It followed that if the share price was the present value of future dividends, the actual pattern of those dividends did not matter to the share price as long as the present value of these remained unchanged. For example, shareholders would be indifferent in valuing a share between a constant stream of dividends and a large lump sum dividend paid at some point in the future, if the value in present value terms were the same.

M&M therefore concluded that the only way to enhance the share price was to invest in positive NPV projects, as these would result in a higher present value of dividends reflecting the beneficial project cash flows being paid out as dividends.

The current dividend should be whatever was not needed for investing in positive NPV projects (residual dividend policy).

M&M suggested that any shareholders who require income (ie dividends) and who are unhappy with the level of dividend paid can sell some of their shares. These shares will have increased in value as a result of the company accepting positive NPV projects.

This is in effect the manufacture of 'home-made' dividends.

No loss of wealth would result as in a perfect market there are no transactions costs.

(ii) **Reasons the company may not pay a CU2m dividend**

- **Imperfections in the capital market**

  The above analysis assumes a perfect capital market and that any imperfections will impair the conclusion. The major imperfections that may cause Southern Industrial Services Ltd to reconsider its dividend are discussed below.

- **Information content of dividends**

  In a perfect market investors know everything about a company and its intentions, and in particular know that a dividend is reduced only in order to fund attractive projects.

  In reality, information is restricted and many investors may not be aware of the reasons.

  The dividend itself is taken as an important indicator of company health, and cutting the dividend from its previous fairly constant level may convince the investors of problems in the company.

  If enough shareholders decide to sell their holding the share price will drop.

- **Tax preferences of shareholders**

  A perfect capital market assumes indifference between income in the form of dividends and capital gains made as the share price rises.

  In reality, however, the different tax positions of investors will mean that some prefer dividend income, while some prefer an increase in share prices.

- **Transaction costs**

  The buying and selling of shares is not costless in the real world.

  Therefore, the 'manufacture' of home-made dividends would cause a loss in the wealth of shareholders, leading to a preference for payouts (dividends) rather than retentions.

- **Clientele theory**

  It follows that Southern Industrial Services Ltd should discover whether its shareholders prefer dividends or capital gains.

  However, as the company has been following a policy of paying out most of its profits as dividends for a number of years, it is likely to have attracted those investors (or the clientele) who prefer this policy.

  A change to one of retaining profits in order to give a capital gain may well be unpopular with these current investors, and may prompt a wide trading of the shares as they are replaced by investors who prefer a policy of retention.

- **Preference for cash now**

  Some investors will prefer to take the dividend now, rather than rely on an increase in future years.

  In a perfect market this will be fully reflected in the discount rate (cost of equity) used and so be compensated in the share price; in real life this may not be so.

- **Other sources of finance**

  While there are arguments for continuing to pay out nearly all the profits as dividend, it must be recognised that viable projects need funding, and that using retained earnings is far cheaper than any other source of equity finance.

  However, the company currently has no debt, and finance could be raised with a reasonably cheap redeemable or irredeemable debenture.

  Management, however, normally consider retained earnings to be more convenient than external equity or debt, and it is likely that the company will want to retain some of the CU5m profit for projects and for unexpected needs.

- **Project estimates**

  The calculation of the dividend depended upon the net present value of the projects, which in turn depended upon estimates of the cash flows and the company's cost of capital.

Reassessment of any of these estimates may lead to a different dividend, and the company may want to undertake some sensitivity analysis on these net present values.

- **Future fund raising**

  If the firm is about to embark upon a major expansion programme, it is likely to need external equity in the near future.

  It could therefore be unwise to cut dividends too sharply, as this could undermine shareholder confidence in the new management and make later issues of new equity difficult.

4 MILLER SHARP LTD

Notes for chief executive on proposed uses of funds received

In advance of next week's meeting I have set out below the arguments for and against the three proposed uses of the funds received from the sale of our furniture production division. Where not referred to in considering the major proposals, I have also set out the arguments for or against the specific suggestions of the board of directors.

Preliminary observations

The sale of our furniture production division has narrowed our area of operations and we have lost the benefits of diversification. Miller Sharp's earnings are subject to greater specific risk than was previously the case and its earnings are likely to be more volatile.

As a manufacturing concern Miller Sharp has significant tangible assets. However, as a manufacturing company we also have significant fixed costs. This indicates high operating gearing and hence relatively volatile returns.

WACC and shareholder wealth

If the cost of capital behaves as the traditionalists propose, and Miller Sharp has moved beyond its optimal capital structure, redemption of debt finance may lead to a reduction in the cost of capital.

This, in turn, could lead to an increase in shareholder wealth.

The traditionalists would argue that shareholder wealth will fall and the cost of capital rise when debt is repurchased if Miller Sharp is currently at or below its optimal capital structure.

Modigliani and Miller have shown that (assuming perfect capital markets) the cost of capital will rise if the gearing ratio is reduced.

In addition, shareholder wealth will fall by the present value of the tax savings lost.

Repurchase of shares and payment of a special dividend, leading to increased gearing, will have the opposite effects to those described above for redeeming debt.

Finance risk and bankruptcy

The repurchase of loan stock will lead to a reduction in financial gearing. This will reduce the financial risk experienced by Miller Sharp, making bankruptcy and its associated costs less likely.

Repurchase of shares and payment of a special dividend will reduce the relative value of equity from its current level and hence increase relative financial gearing. This will increase the finance risk experienced by Miller Sharp and hence the risk of bankruptcy (and associated costs).

Cost of equity

With a reduction in financial gearing through repurchase of loan stock, shareholders should perceive that the volatility and hence risk of dividends has reduced (the company will not be committed to fixed interest payments out of variable earnings). This should lead to a reduction in the required return and hence cost of equity capital.

The reverse is true with repurchase of shares or payment of a special dividend.

Tax

Whilst paying interest on debt may be tax deductible, and hence lead to tax savings, this benefit is only experienced if Miller Sharp is in a tax-paying position. The reduction in debt finance makes tax exhaustion less likely.

The redemption of debt is unlikely to lead to significant tax payments for the debt holders. It is hence relatively efficient from the personal tax perspective.

By increasing relative gearing through repurchase of shares or paying a special dividend rather than use the cash to generate earnings, the company has increased the risk of tax exhaustion.

The repurchase of shares is treated as a distribution for tax purposes (to the extent that the sum paid for the shares exceeds the nominal value). An element of the proceeds is hence subject to income tax in the hands of the recipient.

Since dividends are assumed to be received net of lower rate tax, many shareholders will prefer to realise what is currently share value as a dividend. This is because a capital gain will be received without any associated tax credit.

Market perceptions

The production director has suggested that Miller Sharp's share price would rise in response to a reduction in debt finance. This may be true if the markets perceive Miller Sharp to be excessively geared and share prices reflect the cost of financial distress.

It is probable that the markets would receive the news unfavourably. Issuing debt is seen as a sign of confidence regarding future earnings capacity and favourable investment opportunities. An early redemption of debt could be seen as an indication of reducing future earnings or a lack of feasible investment opportunities. This would exert a downward pressure on the share price.

The sum employed to repurchase shares would be significant. Demand for shares would be likely to increase the share price and hence shareholder wealth. This may, however, be temporary.

The marketing director has suggested that the repurchase of shares would be taken as a sign of weakness by the markets. This may well be the case if investors perceive the company to lack viable investment opportunities. A downward pressure on the share price is likely to result.

Assets

The company has significant tangible assets which can be used as security for cheap debt finance. To redeem debt would fail to utilise the assets fully.

The repurchase of shares and payment of dividend would not affect the level of debt finance and the company would continue to employ its assets efficiently as security for cheap debt.

Control

The repurchase of shares can be used to buy out dissenting minorities or manipulate control of the company to the advantage of the board or a particular group of shareholders.

The proportion of shares to be repurchased is significant, and Miller Sharp could come under the control of a single or small group of shareholders. This may significantly limit the board's freedom of operation.

The payment of the dividend would not disturb the effective control of shareholders. This may be favourably received by some investors.

Repurchase of debt – other

Since future interest commitments are lower, dividends and earnings per share would be expected to increase above previous levels. This should exercise a positive influence upon the share price.

The loan stock contracts would need to be examined to ensure penalties for redemption are not too severe. Should the proposed mechanism be repurchase from the market, brokers' fees would need to be accounted for.

Payment of dividend – other

Dividends often give signals to the market. Such a dividend may be perceived as a signal of extreme confidence in future earnings and dividends, and hence exert a positive influence on the market share price.

Shareholders may prefer to get a return on their shares now (in the form of a special dividend) than have an uncertain capital gain in the future. It should be noted that the gain can, however, be made certain by shareholders selling shares at the current market value.

Assuming perfect capital markets, Modigliani and Miller have shown that in order to maintain shareholder wealth a company should immediately distribute any surplus funds it cannot usefully invest.

Since no favourable investment opportunities exist for Miller Sharp, shareholder wealth is best maintained by an immediate distribution. (It should be noted that in theory shareholder wealth is also maintained by repurchasing shares.)

As compared with other alternatives, the payment of a dividend would not involve transaction costs (brokers' fees, etc). Shareholder wealth is therefore not depleted.

Miller Sharp has always paid a modest dividend according to the finance director. Investors may well have been attracted to Miller Sharp precisely because of this policy.

Should Miller Sharp suddenly pay an enormous dividend shareholders will become concerned that its dividend policy does not suit their needs. The consequent sale of shares would lead to a depression in the share price.

The payment of such a large dividend would almost certainly indicate to the market that Miller Sharp lacks favourable investment opportunities. The market may then revise its expectation of future returns and the share price may fall.

Bonus issue

(a) **Arguments in support of proposal**

By retaining the cash the company will ensure it preserves liquidity.

A bonus issue will increase the number of shares in issue without in any way altering shareholder wealth or the market value of the company.

The drop in share value renders the shares more marketable as the unit cost per share becomes smaller.

(b) **Arguments against proposal**

Earnings per share and net assets per share would fall. A drop in these indicators may naively be interpreted as unfavourable.

Unless Miller Sharp can reinvest the cash proceeds profitably, simply holding on to the cash will result in a reduction of shareholder wealth. The more Miller Sharp delays in distributing the surplus cash the less is its effective value to the shareholders.

A bonus issue does not address the question of dealing with the cash.

Combinations

The arguments for and against using each option individually have already been discussed. There may, however, be particular benefits to combining some of the options available.

(a) **Combining repurchase of shares and debt**

If Miller Sharp has a known optimal gearing level, combinations of share and debt repurchase could be used to achieve this optimum.

This would lead to the lowest possible cost of capital for Miller Sharp and probably result in a gain in shareholder wealth.

By repurchasing smaller volumes of both debt and equity Miller Sharp may not have to pay as large a premium over equilibrium value as if it attempts to repurchase a very high volume of either debt or equity (as effective demand is lower).

(b) **Combination of share repurchase and other option**

By exercising only a partial repurchase of shares Miller Sharp would be better able to manipulate control of the company. Miller Sharp could simply buy out any dissenting minority willing to sell their shares on favourable terms.

5 TRB

(a) It is likely that TRB had problems in servicing (paying interest on) its borrowings and its long term creditors (quite possibly banks) would also have been concerned that they might not get back the full amount that they lent to TRB. Thus they were keen to get as much of their money back as possible. The debentures were sold on and the long term creditors were, presumably, satisfied with the negotiated

price. However the new debenture holder (Mayo) does have considerable power and if a company, such as TRB, is in "financial distress" then Mayo can take control of its assets and in effect take control of TRB as a whole. Shareholders are indeed the owners of the business and normally yield the most power. However, in certain situations (ie distress) that power can shift over to the debt holders. As the debt market becomes more liquid and companies such as Mayo take advantage of that situation (buying the debt of distressed companies) what happened to TRB will happen more frequently.

(b) **Traditional school of thought**

Shareholders would prefer dividends today rather than dividends or capital gains in the future. Cash now is more certain than in future.

Future payments would be discounted at a higher rate to take account of uncertainty.

If current dividends are reduced so that investment can occur then the market value will fall as the discount rate increases. However does risk increase over time?

Residual theory of dividends

Company should reinvest earnings rather than pay a dividend as long as the rate of return achieved is higher than that of other investment opportunities which have similar levels of risk and which are available to the shareholders. Otherwise pay a dividend.

This can cause erratic dividend payments and these may not meet cash demands of shareholders. Erratic dividends may give bad market signal. Sharp fluctuations in dividends can lead to sharp fluctuations in share price.

Modigliani and Miller

MM contend that share value is not determined by dividend policy, but by future earnings and the level of risk. They argue that the amount of dividends paid will not affect shareholder wealth providing the retained earnings are invested in profitable investment opportunities.

Any loss in dividend income will be offset by gains in share price.

Shareholders can create home made dividends and don't have to rely on the company's dividend policy. So if cash is needed, sell some shares instead.

Other issues

Informational content – dividends mean that management is confident of the future (the *signalling* view). Clientele effect – investors have a *preferred habitat*. That is, they seek a company with a particular dividend policy that suits them. If shares are unpopular because of inconsistent policy then the share price will suffer.

CHAPTER 8

Business planning, valuation and restructuring

Introduction

Examination context

Topic List

Summary and Self-test

Answers to Interactive questions

Answers to Self-test

Introduction

Learning objectives

	Tick off
• Explain the different types of financial restructuring that are relevant at various stages of a business life-cycle	☐
• Calculate values for businesses and shares	☐
• Set out the main components of a business plan	☐
• Identify a company's liquidity position by producing forecasts	☐
• Analyse a company's financing requirements using appropriate evaluation techniques	☐

The syllabus references that relate to this chapter are 1d, g, m, 3i, j.

Syllabus links

The focus on high level decision-making such as corporate restructuring, business valuation and the analysis needed to support both will be taken further in the case study.

Examination context

In the exam, candidates may have to draft a straightforward business plan for a given situation. Either separately or as part of this, candidates may have to identify and evaluate different financing options and give a recommendation. In addition, they may be required to carry out a valuation of a business using different methods, perhaps for the purpose of stock exchange listing.

1 Valuation and restructuring

Section overview

- Organic growth achieves expansion of the business at a measured pace and cost.
- Acquisition increases the speed of a business' development but creates a number of issues.
- The maximum price to pay = MV of combined business – MV of bidder before bid is made.
- There are a number of different ways to value a business, broadly based on its assets and income.
- The method of payment will have an impact on how attractive the bid is.
- Investments typically have a strategic rationale.
- MBO – various parties act to achieve their own agendas.
- Outsourcing – another corporate structuring device.

1.1 Introduction

- Businesses will typically use restructuring devices to help them to grow and, having reached maturity, to help to stop them from going into decline
- Almost all firms seek to grow 'organically' at some stage, by starting up new businesses from a zero base, possibly using retained earnings as the source of finance
- Mergers and buying parts of other businesses can, however, be a faster approach to growth. These can also be useful approaches to diversifying as a means of avoiding decline as products pass maturity
- Sell-offs, including management buy-outs and buy-ins, can be ways for the business to dispose of areas that it does not want to retain - it may not want to retain them because it sees them as going into decline, or they are a poor fit with the business, or as a means to raise cash to pursue other more profitable activities
- Mergers, takeovers, sell-offs etc all require a value to be put on the business

1.2 Organic growth

This involves the retention of profits and/or the raising of new finance (equity and/or debt) to fund internally-generated projects, eg new product and/or market development.

Advantages

The advantages of organic growth over growth by acquisition are that:

- The costs are spread over time (although it *may* involve higher costs than acquiring other companies)
- The rate of change within the firm is likely to be slower and therefore avoids the disruption and behavioural problems that can be associated with acquisition

Disadvantages

However, compared with acquisition the disadvantages are that:

- It may be more risky than acquiring an established business, eg risk of failure in an unknown market
- The process may be too slow, so that the firm fails to exploit the opportunities available
- There may be barriers to entry in new markets

1.3 Acquisition

Here the **bidder** company acquires the **target** company either in its entirety or by buying sufficient shares in the target to exercise control.

The acquisition may take the form of a takeover or merger. For legal and accounting purposes the difference can be important but it is not part of the Financial Management syllabus. In the real world the terms are used interchangeably to cover anything which results in the combination of two (or more) businesses.

Some of the reasons why businesses combine are as follows:

- **Synergy**

  Described as the 2 + 2 = 5 effect, this is where a firm looks for combined results that reflect a better rate of return than would be achieved by the same resources used independently as separate operations. The combined performance is greater than the sum of the parts.

  Synergistic savings may arise in a number of different aspects of a company's value chain

  – Administration savings
  – Economies of scale
  – Use of common investment in marketing, new technologies, research and development
  – Leaner management structures
  – Access to under-utilised assets

- **Risk reduction**

  For well-diversified shareholders already owning shares in both businesses, then putting them together does not reduce systematic risk so 2 + 2 = 4. However, cheaper borrowing may be possible because the combination of the firms may result in more stable cash flows, reducing the risk of bankruptcy and reducing the risk to lenders. WACC would also be reduced.

- **Reduced competition**

  Merging with or acquiring another firm reduces or eliminates competition in a market.

- **Vertical integration**

  Acquiring a key supplier of materials or a key customer may safeguard the position of a business.

  The key question is whether shareholder wealth increases. The empirical evidence suggests

- Synergy is not automatic, it must be pursued.

  Consider

  – Sharing activities, for example two subsidiaries sharing the same distribution system.
  – Transferring skills, for example a subsidiary good at marketing could transfer its skills to other subsidiaries.
  – Restructuring. Nursing 'sick' businesses back to health and then selling off to make short-term gains.

  Synergy can be particularly difficult to find if the two businesses are very different: exactly where could costs be saved or expertise transferred?

- Victim shareholders are often the only consistent winners.
- Bidding company shareholders often lose out, for example

  – Pay too much (bid premiums)
  – Costs too much (bid fees)
  – Synergy insufficient to offset these costs.

- Often in the interests of managers, not shareholders.

1.4 Valuation

1.4.1 Reasons for valuation

(a) To establish merger/takeover terms.
(b) To be able to make share purchase/sale decisions.
(c) To value companies listing on the stock exchange.
(d) To value shares sold in a private company.
(e) For tax purposes.
(f) For divorce settlements, etc.
(g) To value subsidiaries for disposals, MBOs, etc.

1.4.2 Asset-based approaches

(a) **Historic cost (book value)**

(i) Balance sheet value of equity.

(ii) Meaningless because historic cost ≠ market value.

(b) **Net realisable value**

(i) NRV of assets less liabilities.

(ii) Minimum acceptable value to owners *determined* to sell.

(iii) Problems

- Estimating NRV of assets (NRV of specialised assets may only be determinable by *actual* sale).
- Redundancy costs, liquidator's costs, tax.
- Ignores goodwill.
- Particularly useful for controlling interests.

(c) **Replacement cost**

(i) Cost of setting up business from scratch.

(ii) Maximum price for buyer.

(iii) Problems

- Estimating replacement costs.
- Ignores goodwill, or if not, this difficult figure would have to be valued.
- Particularly useful for controlling interests.

(d) **General**

(i) Assets are more certain than income. Income is generated only it assets are well managed, which is by no means certain.

(ii) Useful for asset strippers.

(iii) Service businesses. Often have very few tangible assets so asset methods would place very little value on business. Most value in a successful service industry would reside in its goodwill.

1.4.3 Income-based approaches

(a) **General**

(i) Forecasting problems – all income methods require an estimate of the future.

(ii) Type of business – more appropriate than assets for service businesses.

(b) **Present value of future cashflows**

Theoretically superior, as the value of any asset is the present value of the cashflows it generates.

An acquisition would satisfy the shareholder wealth objective if:

(i) The present value of the incremental cash flows discounted at a rate appropriate to their risk exceeds the acquisition cost; and/or

(ii) The risk associated with the bidder's cash flows is reduced such that a lower discount rate is appropriate, increasing the present value of the bidder's cash flows.

The maximum price a bidder should pay for a target is:

Market value of combined businesses less market value of bidder before bid is made.

Anything more than this decreases the wealth of the bidder's shareholders.

(c) **Problems**

(i) Estimating future cashflows (particularly synergy).

(ii) Estimating discount rate (risk).

(iii) Time horizon – forever?

Interactive question 1: Acquisition [Difficulty level: Easy]

A Ltd generates constant annual cash flows of CU15m. The appropriate discount rate for these flows is 20% pa. It plans to make a bid for the entire share capital of B Ltd. If B Ltd were acquired the combined businesses would generate constant annual cash flows of CU20m and the appropriate discount rate would be 16% pa.

Requirement

What is the maximum price A Ltd should pay for all of B Ltd's shares?

See **Answer** at the end of this chapter.

Part of this maximum price arises because there is risk reduction, ie within the CU20m annual cash flows A's flows are now being discounted at 16% rather than 20%, so some risk reduction has taken place.

It is not unusual for the maximum price to be above the current market value of the target. Reasons include the following:

- Synergy. In Interactive question 1 an extra CU20m – CU15m = CU5m of flows is discounted. Some of this may result directly from B's activities and some may be as a result of synergy (see above).
- Risk profile. The overall risk of the combination may be less than the risk of B alone.

Interactive question 2: Maximum price [Difficulty level: Intermediate]

Arrow Ltd is considering purchasing the entire share capital of Target Ltd.

Arrow operates on a five year planning horizon and believes that Target will be able to generate operating cashflows (after deducting funds for necessary reinvestment) of CU1 million per annum before interest payments.

The following information is also relevant but has not been included in the above estimates.

(1) Target's head office premises can be disposed of and its staff can be relocated in Arrow's head office. This will have no effect on the operating cashflows of either business but will generate an immediate net revenue of CU2 million.

(2) Synergistic benefits of CU200,000 per annum should be generated by the acquisition.

(3) Target has loan stock with a current market value of CU1.5 million in issue. It has no other debt.

(4) Arrow estimates that in five years' time it could, if necessary, dispose of Target for an amount equal to five times its annual cashflow.

Arrow believes that a WACC of 20% per annum reflects the risk of the cashflows associated with the acquisition.

Requirement

Calculate the maximum price to be paid for Target Ltd. Ignore taxation.

See **Answer** at the end of this chapter.

(d) Use of Price-Earnings ratios in acquisition

Definition

The **Price-Earnings (P/E) ratio** is the share price divided by the earnings per share for a company.

The above definition gives a clear indication of how a P/E ratio is calculated. The interpretation of the ratio however, is not as clear cut.

Broadly speaking, if a company has a great deal of potential to generate growth, its share price will reflect this: investors look to future returns. If that high price is then divided by its historic earnings, which will be low relative to the anticipated future profits, the consequent P/E ratio will be high.

There can, however, be a number of reasons for P/E ratios being high or low, for example if a company is considered very high risk, this can be factored into the price giving a low P/E ratio. A large, stable, mature business with excellent cashflow generation but very limited growth potential, eg a utility company, might also have a low P/E ratio.

Nevertheless, a generalisation is that a high P/E ratio indicates a high degree of investor confidence in the future prospects of the company.

Similarly a low P/E ratio implies the opposite.

An alternative way in which investors derive the maximum price in practice is to use P/E ratios, rather than present values.

The value of a company can be found as:

Value = P/E × Earnings

Basically, the value is based on the purchase of a number of years earnings.

The problems with using P/E ratios for this purpose are:

- Estimating maintainable future earnings (particularly synergy). What if earnings have been erratic over the last few years?
- Accounting policies can be used to manipulate earnings figures.
- Selecting a suitable P/E ratio to value unquoted companies (there is, of course, less need to value quoted companies as they have a market price already).
  - Find a similar quoted company (same industry, size, gearing, risk, etc).
  - But watch for distorted P/Es (as above).

Adjustments downwards for non-marketability of unquoted shares are often made (totally arbitrarily). In other words, the value is reduced to take into account how difficult it can be to sell unquoted shares. Typically $^1/_3$ to $^1/_2$ is deducted from the initial value to account for non-marketability.

Interactive question 3: P/E valuation

[Difficulty level: Intermediate]

You are given the following information regarding Accrington Ltd, an unquoted company.

(a) Issued ordinary share capital is 400,000 25p shares.

(b) Extract from Income Statement for the year ended 31 July 20X4

	CU	CU
Profit before taxation		260,000
Less: Corporation Tax		(72,800)
Profit after taxation		187,200
Less: Preference dividend	20,000	
Ordinary dividend	36,000	
		(56,000)
Retained profits for year		131,200

(c) The P/E ratio applicable to a similar type of business (suitable for an unquoted company) is 12.5.

Requirement

Value 200,000 shares in Accrington Ltd on a P/E basis.

See **Answer** at the end of this chapter.

Interactive question 4: Maximum price

[Difficulty level: Intermediate]

Price Ltd wishes to acquire the entire share capital of Maine Ltd. Details of current earnings and P/E ratios are as follows:

	Earnings	*P/E*
	CUm	
Price Ltd	50	20
Maine Ltd	20	15

It is believed that as a result of synergies the combined earnings would be CU75m and the market would apply a P/E of 18 to the combination.

Requirements

(a) What is the maximum amount Price Ltd should pay for Maine Ltd?

(b) What price are Maine Ltd's shareholders likely to accept?

See **Answer** at the end of this chapter.

Dividend valuation

A future dividend stream can be valued using the following formula:

$$\text{Value} = \frac{d_0(1+g)}{(k_e - g)}$$

Where d_0 is the dividend at time 0
g is the growth rate
k_e is the cost of equity

Dividend valuation is useful for non-controlling interests (that is, a few shares).

Problems include:

- Estimating future dividends and growth
- Estimating k_e (risk)
- Adjustments for non-marketability. The model is often used for valuing shares in non-quoted companies and then an arbitrary downwards adjustment made to reflect the lack of marketability (as with the P/E ratio approach).
- It is not very useful for valuing controlling interests.

Interactive question 5: Dividend valuation

[Difficulty level: Intermediate]

Claygrow Ltd is a company which manufactures flower pots. The following data are available.

Current dividend	25p per share
Required return on equities in this risk class	20%

Requirement

Value one share in Claygrow Ltd under the following circumstances.

(i) No growth in dividends
(ii) Constant dividend growth of 5% per annum
(iii) Constant dividends for five years and then growth of 5% per annum to perpetuity
(iv) Constant dividends for five years and then sale of the share for CU2.00.

See **Answer** at the end of this chapter.

SVA valuation

The seven key factors which drive shareholder value were covered in Chapter 2. A company valuation can be obtained through forecasting future free cash flows using these value drivers. In order to do this it is important to understand that there are two relevant periods to consider. Firstly, a period where the company enjoys a competitive advantage over its competitors. This could be a period of up to ten years in some cases. Secondly there will be a period after the competitive advantage period. In this second period the cash flows may be given by one of the following methods.

- Cash flow in perpetuity with no growth
- Cash flow in perpetuity with growth
- Given as a lump sum, through using a P/E ratio at the end of the competitive advantage period

Once these future free cash flows have been estimated, they will be discounted at the current WACC to obtain a present value. Any short-term investments that are held by the company should be added to this present value.

Note that the free cash flows show the cash available to the providers of debt and equity, so the market value of debt should be deducted from the present value to get the value of equity.

Worked example: SVA

Mark Ltd expects to have a competitive advantage over its competitors for the next three years. It has the following estimates for its value drivers for this period and beyond.

	Competitive advantage period			*Beyond*
Year	*1*	*2*	*3*	*4+*
Sales growth %	*7*	*4*	*2*	*0*
Operating profit margin %	*10*	*12*	*12*	*12*
Tax rate %	*21*	*21*	*21*	*21*
Incremental non-current asset investment (as a % of sales increase)	*5*	*3*	*2*	*0*
Incremental working capital investment (as a % of sales increase)	*2*	*2*	*2*	*0*

Other information is as follows:

- Current year sales are CU380m
- The current WACC is 10%
- Depreciation for the current year will be CU7m, increasing by CU0.5m each year in the competitive advantage period
- Replacement non-current asset expenditure is assumed to be equal to depreciation
- Short-term investments are held with a value of CU2.5m
- Debt held by Mark Ltd has a nominal value of CU120m and has a market value of CU95 per CU100

Calculate the value of equity using the SVA method.

Solution

The information above can be used step by step to calculate the free cash flows

	Competitive advantage period			Beyond
Year	1	2	3	4+
	CUm	CUm	CUm	CUm
Sales (W)	406.6	422.9	431.3	431.3
Operating profit	40.7	50.7	51.8	51.8
Tax	(8.5)	(10.6)	(10.9)	(10.9)
Depreciation	7.0	7.5	8.0	8.0
Operating cash flow	39.2	47.6	48.9	48.9
Replacement non-current asset expenditure	(7.0)	(7.5)	(8.0)	(8.0)
Incremental non-current asset expenditure (W)	(1.3)	(0.5)	(0.2)	0.0
Incremental working capital investment (W)	(0.5)	(0.3)	(0.2)	0.0
Free cash flow	30.4	39.3	40.5	40.9
Discount factor	0.909	0.826	0.751	0.751 × 1/0.1
Present value	27.6	32.5	30.4	307.2

Total present value = CU397.7m

Value of short-term investments = CU2.5m

Market-value of debt = 120m × 95/100 = CU114m

Value of equity = CU397.7m + CU2.5m – CU114m = CU286.2m

WORKING

Year	*0*	*1*	*2*	*3*	*4+*
	CUm	*CUm*	*CUm*	*CUm*	*CUm*
Sales (increasing at given rates)	380.0	406.6	422.9	431.3	431.3
Sales increase		26.6	16.3	8.4	0
Incremental non-current asset expenditure		1.3	0.5	0.2	0
Incremental working capital investment		0.5	0.3	0.2	0

1.5 Other factors in valuation

1.5.1 Quoted companies

- Existing market value (that is, stock market share price) normally a minimum (why would a shareholder accept less than the current market value?)
- Premiums for bulk buying/control

1.5.2 Income valuations

- Surplus assets. The estimated NRV of *surplus* assets (ie those not generating income) should be added to the income value to determine overall value.
- Trade and non-trade investments. Trade investments are held long-term and dividends etc from these should be included in earnings to calculate income valuations. Non-trade investments are those held short-term. Dividends etc should be excluded from earnings used to calculate income valuations and the market value of the investments added on at the end.
- Freehold properties. The view commonly taken is that a company with the freehold interest in its premises has made an investment. Ownership of the freehold is not necessary to carry on the business - rented premises could be used. Thus in valuing the company it is common to charge market rent in calculating earnings for the purpose of income valuations and add the value of the freehold on separately at the end.

- Directors' remuneration. Frequently the level of remuneration paid to directors in private companies is based on tax rather than commercial considerations. Earnings should reflect a fair commercial reward for their services for the purposes of valuation.
- Preference shares and debentures. Earnings before charging interest and preference dividends can be capitalised at the WACC to find the value of *all* the capital. Total capital value less the market value of all the preference shares and debt (or redemption value if no market value exists) leaves the value of the equity.

1.5.3 General

- Human resources. Will key employees leave after acquisition thus reducing the value of the business?
- Service contracts. Do key staff have service contracts with long notice periods? Do unwanted staff have service contracts with long notice periods and high payoff clauses for early termination?
- Restrictive covenants. Do the victim's debt agreements contain clauses for immediate repayment of the debt in the event of a takeover?
- Other bidders will tend to push up the price.

1.6 Methods of payment

Several forms of offer can be made:

		Buyer	Seller
Cash	For:	• More attractive to seller	• Certain amount received
	Against:	• Liquidity issues	• Possible immediate tax issues
Share for share exchange	For:	• Preserves liquidity • Sellers can undertake not to sell the shares for a period to ensure their continued cooperation with the buyer	• No immediate tax issues
	Against:	• Increased dilution	• Uncertain amount received • Dealing costs to sell shares
Loan stock-for-share exchange	For:	• Avoid dilution	• More assured return than on shares
	Against:	• Gearing problems	• May prefer equity

In practice a combination of methods may be used, eg the main form of the bid may be the share-for-share exchange but with a cash element to act as a 'sweetener' from the target's point of view.

1.7 Reasons for divestment

For every buyer there must be a seller and therefore divestment is as common as investment. A number of reasons can be put forward for divestment of a subsidiary:

- **Lack of fit** within the existing group of companies – often a subsidiary that is unprofitable or incompatible with other operations is sold to allow the firm to concentrate on activities in which it is more successful
- The subsidiary is **too small** and does not warrant the management time devoted to it
- A belief that the individual parts of the business can be worth more than the whole when shares are selling at less than their potential value – the so-called **conglomerate discount**. This is sometimes expressed as 5 – 1 = 5! This does not necessarily involve immediate divestment but can lead to part of a business being transferred to a new company which is still owned by the existing shareholders (known as a demerger or a spin-off – see below).
- It is **trading poorly** but selling the subsidiary as a going concern may be a cheaper alternative than putting it into liquidation, particularly when redundancy and winding-up costs are considered
- The parent company may need to improve its liquidity position, particularly when a good offer is forthcoming

- Highly acquisitive organisations view companies as **portfolios of assets** and dispose of companies as risk and returns change – they frequently acquire them with a view to retaining some aspects of the business and selling the remainder to recoup much of their initial investment

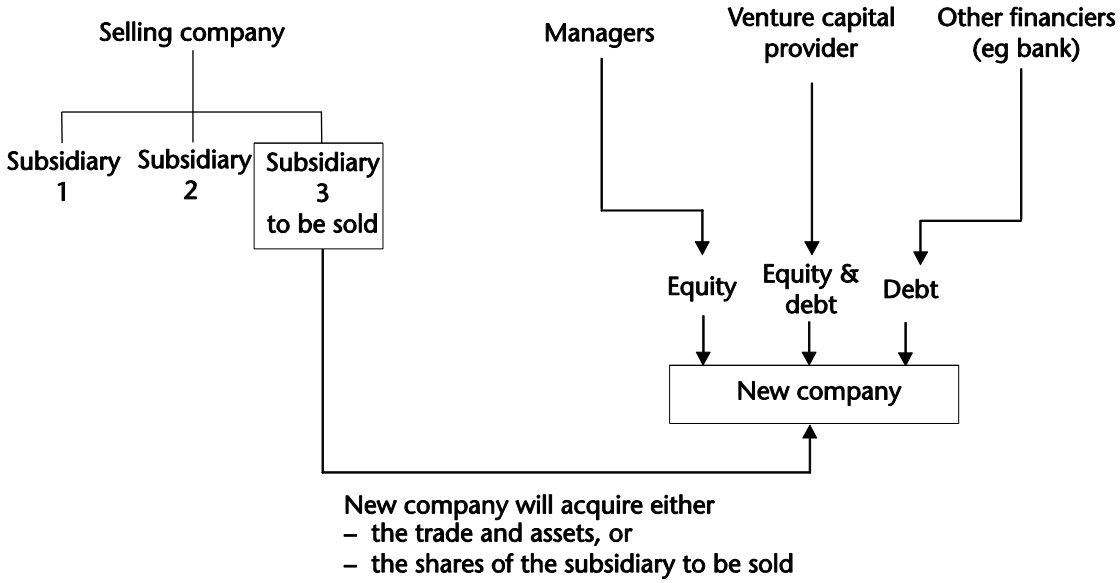
The following sections consider briefly how divestment may be achieved.

1.8 Management buy-outs (MBOs)

The part of the business being sold (eg a subsidiary) is bought by its **existing** management from the parent company.

1.8.1 Parties to an MBO

The various parties for an MBO and their involvement is typically (but not always) as shown below.



1.8.2 Financing the MBO

It is not uncommon for the various parties to want an exit route at some point in the future, by selling the business, possibly by floating the firm on the Stock Exchange, thus helping to repay most of the initial finance.

It is this initial finance, however, that can cause problems, because large amounts of debt are often used in the financing package. Hence the alternative term to MBO of leveraged (or geared) buy-out. In times of recession these large amounts of debt have often led to MBOs failing, ie insolvency.

The two following common types of debt are typically (but not exclusively) used in MBOs:

- **Junk bonds** – these are high risk because they rank behind other forms of debt in terms of claims on assets. This results in a high cost of capital for this type of debt

- **Mezzanine** – similar to junk bonds but the coupon rate is reduced by allowing the possibility of equity participation either through an option to convert the debt to shares or by attaching warrants. Warrants are options, which give the investor the right to buy shares in the future.

1.8.3 Management buy-ins (MBIs)

Essentially the same as an MBO but the business is bought by an **external group of managers** who have not previously been connected with running the business. Often used when the shareholders in a family owned business need an exit route from the business.

1.8.4 Sell-offs

The sale, normally for cash, of part of the operations of a business to another established business. Only the assets may be sold, the seller using the cash to settle any remaining debts.

Interactive question 6: MBO [Difficulty level: Intermediate]

Can Ltd is divesting one of its subsidiaries and the managers of the subsidiary have offered an attractive price of CU20m subject to confirming a finance package with a venture capital provider (VC) and a bank.

The finance package is as follows.

	CUm
Equity from managers	2
Equity from VC	1
Mezzanine finance from VC	7
Senior debt from bank	10
	20

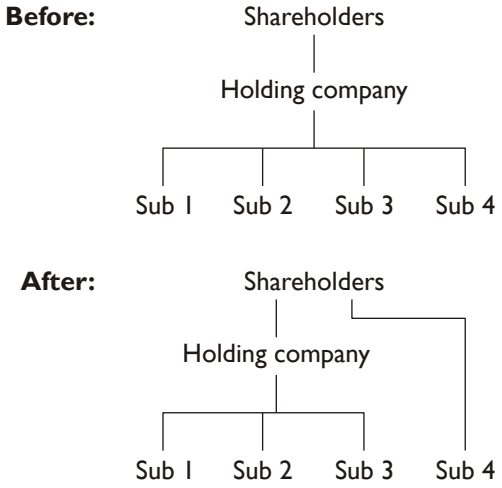
What are the objectives facing the various parties (sellers, managers, venture capitalists and the bank), and how might they manage their specific risk?

See **Answer** at the end of this chapter.

1.9 Other arrangements

1.9.1 Spin-offs or demerger

Diagram showing a demerger



The shareholders are given shares in the new entity *pro rata* to their shareholding in the original parent.

- No change in ownership occurs, ie the shareholders now have shares in two separate businesses
- The spin-off gives separate corporate identities. Shareholders can choose whether they wish to realise their investment in one or other of the two businesses or remain shareholders
- The spin-off may avoid the problem of conglomerate discount discussed above
- It may be used as a device to avoid the takeover of the **whole** business by separating a particularly attractive part using the spin-off

1.9.2 Repurchase of own shares

Reasons for repurchase include the following:

- **Enhancement of share price** – there may be an increase in the price of the shares remaining because the supply is reduced and because earnings per share may be enhanced where cash used for the repurchase was not previously earning an adequate return
- **Escape route** – it provides a mechanism for shareholders in unquoted companies to sell their shares

- **Gearing** – if gearing is less than some target level because of over-retention of profits, a buy-back can be used to reduce equity and to increase gearing

1.9.3 Liquidation (or winding-up)

The ultimate corporate restructuring device is to liquidate the business. This results in the passing of the assets, net of liabilities, to the shareholders in proportion to their individual shareholdings. Usually the assets are first converted into cash, but assets other than cash can be distributed to shareholders. Windings-up are typically initiated:

- either by the shareholders, because the purpose for which the business was founded has, by intention or otherwise, come to an end; or
- by the creditors, because their interest and/or redemption payments are overdue

1.9.4 Outsourcing

Though not strictly a corporate restructuring device, outsourcing can often have a similar effect. Outsourcing is acquiring the goods and services needed by the business from another business, rather than from within. All businesses outsource and it is not a new phenomenon.

What is **a recent development** is the extent of outsourcing. The logic of extending outsourcing is to enable the business to concentrate on what it sees as its core activities, while buying in specialist goods and services from experts.

Thus a motor car manufacturing business might not employ staff to operate its personnel function, but instead outsource it to a specialist human resources business. This might be because the managers see car manufacturing as their specialist skills area, so they leave providing the personnel function to others who specialise in that area.

Other examples of outsourced functions are IT systems, accounting, catering and property maintenance.

Advantages of outsourcing include access to **specialist skills** at a lower cost to the business than would be incurred by having specialist staff on its own payroll. Another advantage is that the business can use its **investment capital** for its core activities.

Disadvantages include the potential **loss of control** present in any sub-contracting arrangement.

As with all corporate decision-making, outsourcing should be undertaken to the extent that it has the effect of enhancing the wealth of shareholders.

2 Writing a business plan

Section overview

- A business plan reflects a company's planning process for a given time horizon.
- Business plans will include sections on background, history, prospects and a financial assessment.

2.1 Introduction

A written business plan is a result of a process of planning, and sets out:

- The direction of an organisation
- Strategies chosen
- The background to the decisions made
- Their practical implications and outcomes

In a broad sense, planning is the process of deciding in advance what is to be done. When planning takes place in an organisation it involves an explicit evaluation of alternative courses of action and communication of the decision process to others.

An organisation's survival depends on maintenance of an income stream, and ensuring that it has the resources – people, equipment, premises, materials and funds – with which to carry out its activities. Changing environments mean that planning is a continuing process. A business plan must be updated regularly to maintain its usefulness.

A business plan can be produced for any period or scale of activity. Most organisations have **long-term plans** of about ten years as well as **business plans** for three to five years and **operational plans** for the next twelve months.

The document does not need to be over long, but must justify its financial forecasts. This means that sufficient weight must be given to:

- Marketing, sales and growth forecasts
- Competitor analysis
- Risk analysis
- Cost control.

2.2 Format of the business plan

2.2.1 A standard format: Layout, supporting documents and appendices

Front sheet: Title page, foreword or disclaimer
Contents page

1 Executive summary
2 History and background
3 Mission statement and objectives
4 Products or services
5 Market information
6 Resources employed, management and operations
7 Financial information, risks and returns
8 Summary action plan containing milestones
9 *Appendices – past accounts, CVs, market research, brochures, technical data etc.*

Executive summary	The executive summary is typically a one-page document that allows the reader to grasp the nature and purpose of the business plan quickly and understand the detail by providing a context.
History and background	This section is designed to provide an insight into the business's goals, strengths and weaknesses, provide a context for decisions by describing its origins and trading record and for new ventures, to describe how the business idea developed.
Mission statement and objectives	Mission statement indicates how the business wants to be seen – its long-term goal, whereas objectives, long and short-term, state what the organisation intends to achieve during the plan period.
Products and services offered	A brief statement of products and services provided and customers, together with any unique selling proposition differentiating the product from competitors, as well as any planned further development of the product or service.
The market	Distribution and promotion methods, type of buyer, demographic description, location, occupation, quality required, etc, competitor pricing and a comparison of products and services, market characteristics and trends and market research.
Information about resources employed, management and operations	• Key people and management team – CVs, job descriptions, succession plan, organisation chart • Premises – Address, type of tenure, planning permission, size, facilities, costs • Operations – A broad description of how the goods or services are provided
Financial information in a business plan	**A financial summary should highlight:** • Past and present revenue • Profitability • Key aspects of the balance sheet and cash flow • Impact of any identified risks and contingency plans for them

	• Amount and timing of finance required • The offer to the equity investor, if applicable, including exit route • Anticipated gearing • The purpose of any finance sought **A business plan will typically include the following forecasts:** • Cash flow in monthly intervals for the first year of the plan • Revenue forecast in monthly or longer intervals for the first year • Sales forecasts supporting the income projections • Financial forecasts in quarterly or annual intervals up to five years **It will often be appropriate to include sensitivity analysis and 'what if' analysis:** • Breakeven calculation – especially useful when sales are uncertain • Setting up costs – a separate statement for a new venture or activity • Projected balance sheet if there are significant changes to the capital structure or assets • Payback Period, Net Present Value or Internal Rate of Return if used in decision-making
Action plan	An **action plan** is a detailed statement of the main actions needed to carry out the strategy, and a summary should be included in the business plan.
Appendices	Some types of detailed information are better included in an appendix – for example: • Technical product information • Specialist market reports • CVs of key people • Organisation chart • Audited accounts for past three years • Names of accountants, solicitors, bankers

3 Cash forecasts

Section overview

- Cash forecasts provide an early warning of liquidity problems.
- A forecast balance sheet helps identify any cash shortfall (or surplus).
- A forecast cashflow can be derived by adjusting the profit figure.

3.1 Introduction to cash forecasts

Definition

A **cash budget** (or **forecast**) is a detailed budget of estimated cash inflows and outflows incorporating both revenue and capital items.

Cash forecasts (or budgets) provide an early warning of liquidity problems, by estimating:

- How much cash is required
- When it is required
- How long it is required for
- Whether it will be available from anticipated sources

A company must know **when** it might need to borrow and **for how long**, not just **what amount** of funding could be required. This area was introduced in Management Information, where cash management and working capital were explored.

3.2 Cash forecasts based on the balance sheet

The balance sheet-based forecast is produced for **management accounting purposes** and so not for external publication or statutory financial reporting. **It is not an estimate of cash inflows and outflows**. A number of sequential forecasts can be produced, for example, a forecast of the balance sheet at the end of each year for the next five years.

As an estimate of the company's balance sheet at a future date, a balance sheet-based forecast is used to identify either the **cash surplus** or the **funding shortfall** in the company's balance sheet **at the forecast date**.

3.3 Estimating a future balance sheet

Balance sheet-based forecasts can be used to assess the scale of funding requirements or cash surpluses expected over time, and to act as a check on the realism of cash flow-based forecasts.

A balance sheet estimate calls for some prediction of the amount/value of each item in the company's balance sheet, **excluding cash and short-term investments**, as these are what we are trying to predict. A forecast is prepared by taking each item in the balance sheet, and estimating what its value might be at the future date. The assumptions used are critical, and the following guidelines are suggested.

Intangible non-current assets and long term investments	If there are any, they should be taken at their current value unless there is good reason for another treatment.
Property, plant and equipment	Some estimate of **asset purchases** (and disposals) will be required. Revaluations can be ignored as they are not cash flows.
Current assets	Balance sheet estimates of **inventory** and **receivables** are sometimes based on fairly simple assumptions, such as the following: • **Same** as current amounts. This is unlikely if business has boomed • **Increase by a certain percentage**, to allow for growth in business volume. For example, the volume of receivables might be expected to increase by a similar amount • **Decrease by a certain percentage**, to allow for tighter management control over working capital • Assume to be a **certain percentage** of the company's estimated **annual sales revenue** for the year • The firm can assume that the length of the **operating cycle** will more or less **remain the same**

Worked example: Current assets

If a firm's customers take two months to pay, this relationship can be expected to continue. Therefore, if total annual sales are CU12m and customers take two months to pay, receivables at the year end will be $^{2}/_{12} \times$ CU12m = CU2m.

If revenue increases to CU18m, and the collection period stays at two months, receivables will amount to $^{2}/_{12} \times$ CU18m = CU3m. Similar relationships might be plotted for inventory and hence purchases and payables.

Current liabilities

Some itemising of current liabilities will be necessary, because no single set of assumptions can accurately estimate them collectively.

- **Trade payables and accruals** can be estimated in a similar way to current assets, as indicated above.
- Current liabilities include **bank loans** due for repayment within 12 months. These can be identified individually.
- **Bank overdraft facilities**. Often there will be no overdraft in the forecast balance sheet. Any available overdraft facility can be considered when the company's overall cash needs are identified.
- **Taxation**. Any corporation tax payable should be estimated from anticipated profits and based on an estimated percentage of those profits.
- **Dividends payable**. Any ordinary dividend payable should be estimated from anticipated profits, and any preference dividend payable can be predicted from the coupon rate of dividend for the company's preference shares.
- **Other creditors** can be included if required and are of significant value.

Non-current creditors

Non-current creditors are likely to consist of non-current loans, bond issues, debenture stock and any other non-current debt finance. Unless the company has already arranged further non-current borrowing, this item should include just existing long-term debts, minus debts that will be repaid before the balance sheet date (or debts transferred from long-term to short-term creditors). For the purposes of this exam loans will be shown at their nominal value in the balance sheet.

Share capital and reserves

With the exception of accumulated profits (retained earnings), the estimated balance sheet figures for share capital and other reserves should be the same as their current amount, unless it is expected or known that a new issue of shares will take place before the balance sheet date, in which case the total amount raised (net of issue expenses) should be added to the share capital/other reserves total.

Accumulated profits

An estimate is required of the change in the company's **accumulated profits** in the period up to the balance sheet date. This reserve should be calculated as:

- The existing value of the retained earnings
- **Plus** further retained profits anticipated in the period to the balance sheet date (ie post tax profits minus estimated dividends)

3.4 Compiling a balance sheet

The various estimates should now be brought together into a balance sheet. The figures on each side of the balance sheet will not be equal, and there will be a balancing figure being the amount of cash in surplus/deficit.

- If there is a surplus of share capital and reserves over net assets (total assets minus total liabilities) the company will be forecasting a **cash surplus**.
- If there is a surplus of net assets over share capital and reserves the company will be forecasting a **funding deficit**.

Worked example: Funding deficit

Alpha has an existing balance sheet and an estimated balance sheet in one year's time before the necessary extra funding is taken into account, as follows.

	Existing		Forecast after one year		Difference
	CU'000	CU'000	CU'000	CU'000	CU'000
ASSETS					
Non-current assets		100		180	

	Existing		Forecast after one year		Difference
	CU'000	CU'000	CU'000	CU'000	CU'000
Current assets		90		100	
Total assets		190		280	90
EQUITY AND LIABILITIES					
Share capital and reserves					
CU1 ordinary shares	50		50		
Other reserves	20		20		
Accumulated profits	30		50		
		100		120	(20)
Non-current liabilities					
5% loan notes	20		20		
Other (tax)	10		10		
		30		30	
Current liabilities		60		90	(30)
Total equity and liabilities		190		240	

Solution: What is the funding required?

The company is expecting to increase its total assets in the next year by CU90,000 (CU280,000 – CU190,000) but expects accumulated profits for the year to be CU20,000 (CU50,000 – CU30,000) and current liabilities to increase by CU30,000. There is an excess of net assets over share capital and reserves amounting to CU40,000 (CU280,000 – CU240,000), which is a **funding deficit**. The company must consider ways of obtaining extra cash (eg by borrowing) to cover the deficit. If it cannot, it will need to keep its assets below the forecast amount, or to have higher short-term payables.

A revised projected balance sheet can then be prepared by introducing these new sources of funds. This should be checked for realism (eg by **ratio analysis**) to ensure that the proportion of the balance sheet made up by non-current assets and working capital, etc is sensible.

Balance sheet-based forecasts have **two main uses:**

- As **longer-term (strategic) estimates**, to assess the scale of funding requirements or cash surpluses the company expects over time
- To act as a **check on the realism** of cash flow-based forecasts (The estimated balance sheet should be **roughly** consistent with the net cash change in the cash budget, after allowing for approximations in the balance sheet forecast assumptions.)

3.5 Deriving cash flow from income statement and balance sheet information

The previous paragraphs concentrated on preparing a forecast balance sheet, with estimated figures for receivables, payables and inventory. Cash requirements might therefore be presented as the 'balancing figure'. However, it is possible to derive a forecast figure for cash flows using both the **balance sheet** and **income statement**. The profit from operations is adjusted first of all for items not involving cash, such as depreciation. This is further adjusted for changes in the levels of working capital (eg receivables and payables) to arrive at operational cash flows.

This is illustrated in the example below. For the time being, assume that there is no depreciation. The task is to get from profit to operational cash flow, by taking into account movements in working capital.

Worked example: Adjusting profit to find cash flows

	Profit	Operational cash flow
	CU	CU
Sales	200,000	200,000
Opening receivables (∴ received in year)		15,000
Closing receivables (outstanding at year end)		(24,000)
Cash in		191,000

	Profit	Operational cash flow
	CU	CU
Cost of sales	170,000	170,000
Closing inventory (purchased, but not used, in year)		21,000
Opening inventory (used, but not purchased, in year)		(12,000)

Purchases in year			179,000
Opening payables (∴ paid in year)			11,000
Closing payables (outstanding at year end)			(14,000)
Cash out			176,000
Profit/operational cash flow		30,000	15,000

This may be summarised as:

		CU	CU
Profit			30,000
(Increase)/Decrease in inventory	Opening	12,000	
	Closing	(21,000)	
			(9,000)
(Increase)/Decrease in receivables	Opening	15,000	
	Closing	(24,000)	
			(9,000)
Increase/(Decrease) in payables	Closing	14,000	
	Opening	(11,000)	
			3,000
Operational cash flow			15,000

In practice, of course, a business will make many other adjustments. The profit figure includes **items which do not involve the movement of cash,** such as the annual depreciation charge, which will have to be added back to arrive at a figure for cash.

Both 'receipts and payments' forecasts and forecasts based on financial statements could be used alongside each other.

3.6 Quality control of forecasts

When actual results differ from budget, it can be tempting to conclude that plans never work out in practice. However, planning is a vital management activity so, if actual results differ from the plan, it is important to find out whether the **planning processes** can be improved.

Accuracy of cash flow forecasts can be enhanced by:

- **Reviewing actual cash flows** against the forecasts, learning from past mistakes, and
- **Preparing updated rolling forecasts** or revised forecasts, where useful, to replace earlier, less reliable forecasts

A constant monthly amount for receipts and payments will often indicate either sloppy cash forecasting practice, or a high degree of uncertainty in the forecast, since it is rare for specific receivables and payables to remain unchanged except when there is a formal arrangement.

3.7 Forecast financial statements

Forecast financial statements can be constructed for a period of several years, from first year data, given certain assumptions.

Worked example: Financial statement forecasting

Loumar Ltd started trading four years ago in 20X3 and manufactures components for the computer games industry. You have the following information.

(a) Revenue and cost of sales are expected to increase by 10% in each of the financial years ending

31 December 20X7, 20X8 and 20X9. Operating expenses are expected to increase by 5% each year.

(b) The company expects to continue to be liable for tax at the marginal rate of 21%. Tax is paid in the same year it is charged.

(c) The ratios of **receivables to sales** and **trade payables to cost of sales** will remain the same for the next three years.

(d) Non-current assets comprise land and buildings, for which no depreciation is provided. Other assets used by the company, such as machinery and vehicles, are hired on operating leases.

(e) The company plans for dividends to grow at 25% in each of the financial years 20X7, 20X8 and 20X9.

(f) The company plans to purchase new machinery to the value of CU500,000 during 20X7, to be depreciated straight line over ten years. The company charges a full year's depreciation in the first year of purchase of its assets. Tax allowable depreciation at 18% reducing balance is available on this expenditure.

(g) Inventory was purchased for CU35,000 at the beginning of 20X7. The value of inventory after this purchase is expected to remain at CU361,000 for the foreseeable future.

(h) No decision has been made on the type of finance to be used for the expansion programme. The company's directors believe that they can raise new debt if necessary.

A summary of the financial statements for the year to 31 December 20X6 is set out below.

LOUMAR LTD
SUMMARISED INCOME STATEMENT

FOR THE YEAR TO 31 DECEMBER 20X6	CU'000
Revenue	1,560
Cost of sales	950
Gross profit	610
Operating expenses	325
Interest	30
Tax	54
Net profit	201
Dividends declared	85

SUMMARISED BALANCE SHEET AT 31 DECEMBER 20X6

	CU'000
Non-current assets (net book value)	750
Current assets	
Inventories	326
Receivables	192
Cash and bank	73
Total assets	1,341
Financing	
Ordinary share capital (ordinary shares of CU1)	500
Retained profits to 31 December 20X5	222
Retentions for the year to 31 December 20X6	116
10% loan note redeemable 20Z0	300
	1,138
Current liabilities	
Trade payables	135
Other payables (dividends)	68
Total equity and liabilities	1,341

Requirements

Using the information given:

(a) Prepare forecast income statements for the years 20X7, 20X8 and 20X9.

(b) Prepare cash flow forecasts for the years 20X7, 20X8 and 20X9, and estimate the amount of funds which will need to be raised by the company to finance its expansion.

Notes

(1) You should ignore interest or returns on surplus funds invested during the three-year period of review.

(2) Assume all cashflows occur at the start or end of each year and ignore the time value of money.

Solution

(a) LOUMAR LTD INCOME STATEMENTS

	Scenario reference	Actual 20X6 CU'000	20X7 CU'000	Forecast 20X8 CU'000	20X9 CU'000
Revenue (increase 10% pa)	(a)	1,560	1,716	1,888	2,076
Cost of sales (increase 10% pa)	(a)	(950)	(1,045)	(1,150)	(1,264)
Gross profit		610	671	738	812
Operating expenses (increase 5% pa)	(a)	(325)	(341)	(358)	(376)
Depreciation (10% pa × CU500,000)	(f)		(50)	(50)	(50)
Profit from operations		285	280	330	386
Interest (assumed constant)		(30)	(30)	(30)	(30)
Profit before tax		255	250	300	356
Taxation (see working)		(54)	(44)	(58)	(72)
Net profit		201	206	242	284
Dividend (25% growth pa)	(e)	(85)	(106)	(133)	(166)
Retained profit		116	100	109	118
Reserves b/f		222	338	438	547
Reserves c/f		338	438	547	665

	Actual 20X6 CU'000	20X7 CU'000	Forecast 20X8 CU'000	20X9 CU'000
Share capital	500	500	500	500
Year end reserves	338	438	547	665
Year end shareholders' funds	838	938	1,047	1,165

WORKING: Tax payable

		Actual 20X6 CU'000	20X7 CU'000	Forecast 20X8 CU'000	20X9 CU'000
Profit before tax		255	250	300	356
Add back depreciation	(f)		50	50	50
Less tax allowance (18% red./bal)	(f)		(90)	(74)	(61)
Taxable profit		255	210	276	345
Tax at 21%	(b)	54	44	58	72

(b) **Cash flow forecasts**

The 20X6 balance sheet figure for 'other payables (dividends)' is simply the dividends in the income statement. It is assumed that this will continue to be the case in the following three years. The annual change in net current assets can be computed as follows.

Changes in net current assets		Actual 20X6 CU'000	20X7 CU'000	Forecast 20X8 CU'000	20X9 CU'000
Inventories (scenario note (g))	(g)	326	361	361	361
Receivables (12.31% of sales) *	(c)	192	211	232	256
Trade payables (14.21% of cost of sales) *	(c)	(135)	(148)	(163)	(180)
Dividends payable		(85)	(106)	(133)	(166)
Net current assets		298	318	297	271
Increase/(decrease) in net current assets			20	(21)	(26)

* Alternatively receivables and payables can be computed as a 10% increase each year.

The cash flow forecasts can then be constructed.

Cash flow forecasts		20X7 CU'000	20X8 CU'000	20X9 CU'000
Retained profit for the year		100	109	118
Add back depreciation	(f)	50	50	50
(Investment in net current assets)/release of net current assets (see working)		(20)	21	26
Expenditure on non-current assets	(f)	(500)		
Surplus/(deficit) for the year		(370)	180	294
Cash/(deficit) b/f		73	(297)	(117)
Cash/(deficit) c/f		(297)	(117)	77

The company will need to find finance of CU297,000 in 20X7 but this can be completely repaid in the following two years. However, interest costs have been ignored in this computation.

An alternative presentation includes a detailed statement of cash receipts and payments, an illustration of which is shown in the answers at the end of the chapter.

Interactive question 7: Financing gap

[Difficulty level: Exam standard]

Mylotic Ltd produces radio controlled toys. The most recent balance sheet of the company is set out below.

BALANCE SHEET AS AT 30 NOVEMBER 20X2

	CUm	CUm	CUm
Non-current assets			
Freehold buildings at cost		24.4	
Less: accumulated depreciation		4.4	20.0
Plant and machinery at cost		37.9	
Less: accumulated depreciation		12.9	25.0
			45.0
Current assets			
Inventory	39.0		
Trade receivables	20.0		
Bank	8.3	67.3	
Less payables: amounts falling due within one year			
Trade payables	16.5		
Dividends	7.8	24.3	
			43.0
			88.0
Capital and reserves			
Ordinary CU1 shares			20.0
Accumulated profits			68.0
			88.0

During the year to 30 November 20X2, the sales revenue for the business was CU240m.

As a result of recent changes in overseas markets, combined with developments in technology, it has been predicted that the market for the company's products will increase significantly in the short-term. The directors of Mylotic are planning to expand the business significantly during the forthcoming year in order to exploit these new market conditions. The following forecasts and assumptions for the forthcoming year have been prepared by the directors.

(i) Sales for the forthcoming year will be 25 per cent higher than the previous year. Sales are expected to be spread evenly over the year.

(ii) The gross profit margin will be 30 per cent of sales.

(iii) To prepare for the expansion in output, new machinery costing CU57m will be purchased at the beginning of the year and a long-term loan will be taken out immediately to help finance this purchase. At the end of the year, the long-term debt to equity ratio is planned to be 1:3.

(iv) The average receivables collection period will be three times that of previous years and the average payment period for creditors will be one and a half months.

(v) The value of inventory at the end of the year will be CU18m lower than at the beginning of the year.

(vi) Depreciation charges for freehold buildings and plant and machinery are calculated using the reducing balance method and will be five per cent and 20 per cent respectively. Other expenses for the period will be CU54.6m. There will be no prepayments or accruals at the end of the year.

(vii) Dividends will be announced at the end of the year and the dividend payout ratio will be 50 per cent which is in line with previous years. The tax rate will be 21 per cent of net profits before taxation. The dividend will be paid after the year end. Tax is paid in the same year that it is charged.

All workings should be in CUmillions and should be made to one decimal place. Workings must be clearly shown.

Requirements

(a) Prepare in as much detail as the information allows:

(i) A forecast income statement for the year ended 30 November 20X3, and
(ii) A forecast balance sheet as at 30 November 20X3.

(b) Comment briefly on the liquidity and position of the business using the financial statements prepared in (a) above.

See **Answers** at the end of this chapter.

3.8 Sensitivity analysis and changes in variables

In a well-designed forecast a great number of **'what-if'** questions can be asked and answered quickly by carrying out **sensitivity analysis** and changing the relevant data or variables. In a cash flow forecast model, managers may wish to know the cash flow impact if sales growth per month is nil, ½%, 1%, 1½%, 2½% or minus 1% and so on.

However, businesses will also want to estimate the magnitude of changes in sales and ultimately profits if economic or business variables change. This will be more problematic.

3.9 Changes in economic variables

Businesses need to be aware of likely changes in inflation, interest rates and so on. Governments and central banks issue regular updates and forecasts, and the financial press is also helpful as a source of information.

However, businesses will also need to forecast:

- How the **predicted changes** will **affect demand**. The links between variables are complex and may not be easy to forecast. Businesses should consider separately the effect of major increases on each type of product.
- How the **business** will **respond to changes in variables**. For example, will the business automatically adjust prices upwards by the rate of inflation, or will it try to hold prices? What will its competitors do? If raw material prices increase, will the business try to change suppliers? What effect will this have on payment patterns?

3.10 Changes in business variables

Economic variables will clearly impact upon business variables such as **sales volumes** or **profit margins**. Businesses need to be aware of the other factors, such as changes in the competitive environment that could affect these variables and how this effect might work. The original forecast should itself have been based on **demand forecasts,** determined by market surveys and statistical models based on past changes in demand. However, if factors such as taste or lifestyle change, businesses need to recognise this might not just require marginal changes in forecasts, but a re-visiting of the base data, since the changes will ultimately render the previous surveys or models redundant.

4 Financing requirements

Section overview

- **Cash deficits** will be funded in different ways, depending on whether they are short or long-term.
- Businesses should have procedures for investing **surpluses** with appropriate levels of risk and return.

4.1 Deficiencies

Any forecast **deficiency** of cash will have to be funded. Chapter 4 on sources of finance explores these in detail. The main sources are new equity (or preference shares) or increased borrowing. There will be implications of any changes in capital structure for the cost of capital. This topic is explored in Chapters 5 and 6. Questions on this topic may therefore link the materials on all of these chapters together.

- **Share capital**. The firm may consider raising new equity or preference share capital. The cost of issuing and the time frame required for this, together with the level of investor confidence in the equity markets will all need to be factored into the assessment of whether this is suitable.
- **Borrowing**. If borrowing arrangements are not already secured, a source of funds will have to be found. If a company cannot fund its cash deficits it could be wound up.
- The firm can make arrangements to **sell any short-term marketable financial investments** to raise cash.
- The firm can delay payments to suppliers, or pull in payments from customers. This is sometimes known as **leading and lagging**.

Because cash forecasts cannot be entirely accurate, companies should have **contingency funding**, available from a surplus cash balance and liquid investments, or from a bank facility.

The approximate size of contingency margin will vary from company to company, according to the cyclical nature of the business and the approach of its cash planners.

Forecasting gives management time to arrange its funding. If planned in advance, instead of a panic measure to avert a cash crisis, a company can more easily choose when to borrow, and will probably obtain a lower interest rate.

4.2 Cash surpluses

Many cash-generative businesses are less reliant on high quality cash forecasts. If a **cash surplus** is forecast, having an idea of both its size and how long it will exist could help decide what to do with it. This could be investment (Chapters 2 and 3) or dividend payment (Chapter 7).

In some cases, the amount of **interest** earned from surplus cash could create a significant improvement to the company's earnings. The company might then need a forecast of its interest earnings in order to indicate its prospective **earnings per share** to stock market analysts and institutional investors.

4.3 Analysis

In order to explore whether a potential source of finance is viable or attractive a forecast cash flow, balance sheet or income statement is required.

Worked example: Financial decisions

MAX LTD

Max Ltd is a printing and publishing business. The business has traded very successfully for many years, largely on the basis of a life style magazine which has sold well due to the recent fashion for such publications. The increase in the number of similar offerings from competitors however has resulted in a need to re-invigorate the product range.

A plan to launch new magazine titles by the directors is expected to increase revenue by 10% per annum for the foreseeable future. In order to finance the expansion, the directors are considering either a rights issue or new debt finance.

The overheads of the business should be unaffected by the expansion in sales.

Other relevant information is as follows.

- The level of competitive rivalry between the suppliers to this industry is very pronounced, and as a result an increase in direct costs of only 8% per annum is expected

- The working capital will be controlled in the same fashion as before, with no changes anticipated to the terms of trade. Thus the amount of credit taken (in proportion to revenue) and the credit given (in proportion to direct costs) will be unchanged. The increase in the business will require increased inventory of CU5 million
- Depreciation on non-current assets existing at 30 December 20X0 is forecast to be CU5.7m p.a. and it is forecast that CU10 million of new non-current assets will be needed. This, together with the new inventory, will be acquired in the year to 30 December 20X1. Depreciation on these new assets will be 18% on a reducing balance basis starting in the year of purchase
- The company pays tax at 21% per annum in the year in which the liability arises, and capital allowances are available at the same rate as depreciation
- Dividends are payable the year after they are declared. The company intends to maintain the existing payout ratio

Summary financial statements

Income statement year to 30 December 20X0

	CU'000
Revenue	81,000
Direct costs	(45,600)
Depreciation	(5,700)
Indirect costs	(12,000)
Interest payable	(1,500)
Profit before tax	16,200
Tax on profit at 21%	(3,402)
Profit after tax	12,798
Dividends declared	7,679

Balance sheet at 30 December 20X0

	CU'000	CU'000
Non-current assets (NBV)		70,200
Current assets		
Inventory	10,500	
Receivables	14,700	
Cash at bank	3,150	
		28,350
		98,550
Capital and reserves		
Ordinary shares (CU1 nominal value)		15,000
Reserves		47,971
		62,971
Non-current liabilities		
10% debentures 20X5		15,000
Current liabilities		
Payables	12,900	
Dividends payable	7,679	
		20,579
		98,550

The proposed financing methods are:

1 A 1 for 5 rights issue at CU5 per share

2 A CU15 million term loan at 8% interest

Requirement

For the two financing alternatives being considered by the directors of Max Ltd, prepare forecast

(a) Income statements for the year to 30 December 20X1
(b) Balance sheet at 30 December 20X1

(15 marks)

Note: Ignore transaction costs on the issuing of new capital and returns on surplus cash invested short term.

Solution

YEAR ENDED 30 DECEMBER 20X1

INCOME STATEMENT

	Rights issue	Loan
	CU'000	CU'000
Revenue 81,000 1.1	89,100	
Direct costs	(49,248)	
Depreciation 5,700 + (18% − 10,000)	(7,500)	
Indirect costs	(12,000)	
Operating profit (same for each method)	20,352	20,352
Interest payable (Unchanged for RI)(1,500 + CU15m × 8%)	(1,500)	(2,700)
Profit before tax	18,852	17,652
Tax at 21%	(3,959)	(3,707)
Profit after tax	14,893	13,945
Dividend (60% of profit after tax)	(8,936)	(8,367)
Retained profit	5,957	5,578

SUMMARY BALANCE SHEET

CHAPTER 8

	Rights issue	Loan
	CU'000	CU'000
Non-current assets	72,700	72,700
70,200 + 10,000 – 7,500 depreciation		
Inventory 10,500 + 5,000	15,500	15,500
Receivables 14,700 × 1.1	16,170	16,170
Cash (balancing figure)	17,426	16,478
	121,796	120,848
Capital and reserves		
Share capital 15,000 + 3,000	18,000	15,000
Reserves b/fwd	47,971	47,971
Retained profit	5,957	5,578
Share premium on new issue	12,000	0
Debentures 15,000 + 15,000	15,000	30,000
Payables 12,900 □ 1.08	13,932	13,932
Dividend payable	8,936	8,367
	121,796	120,848

Note: The cash position has been identified as the balancing figure above. The cash flow below has been included to illustrate the reconciliation between cash flow and balance sheet.

CASH FLOWS

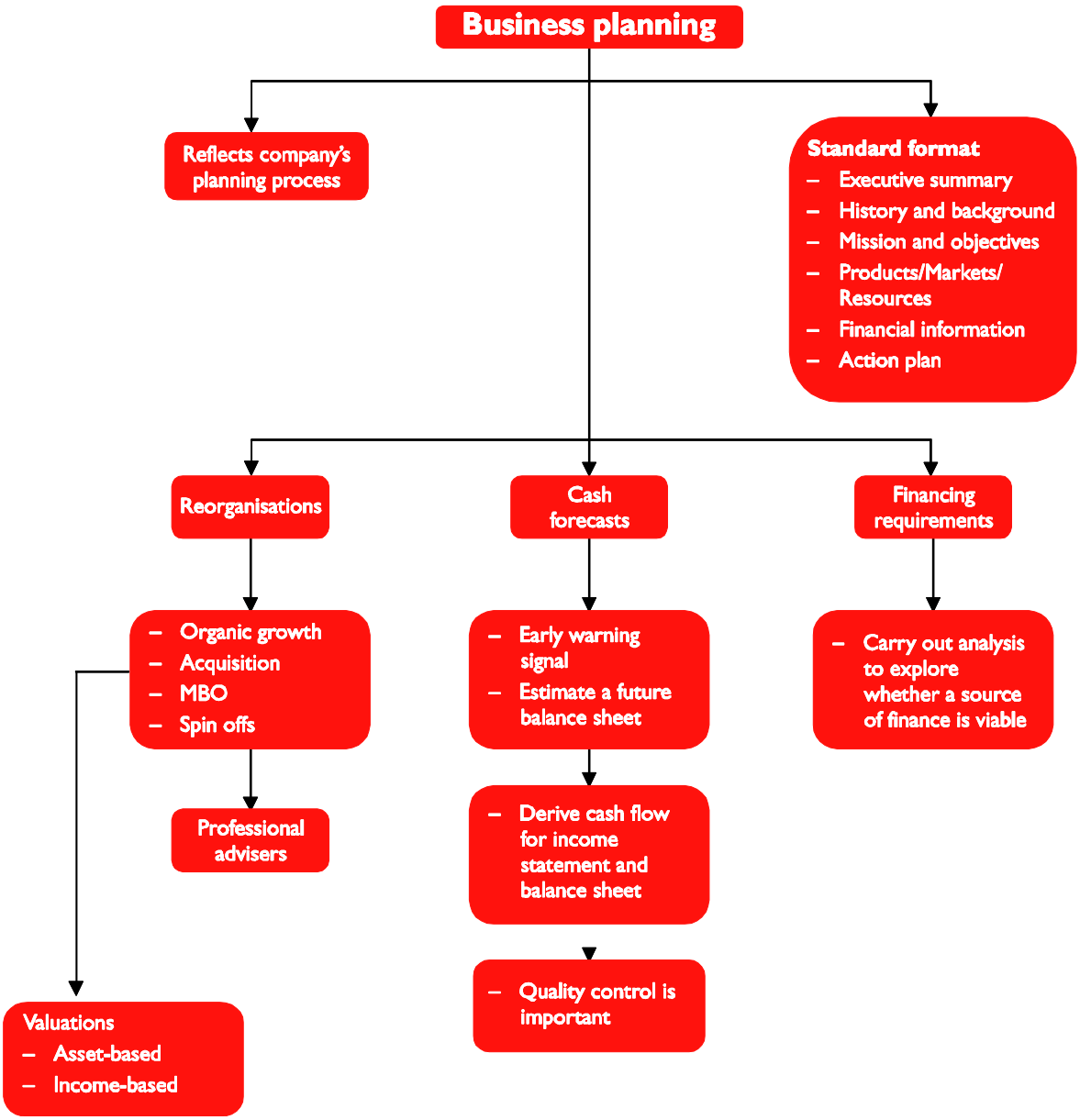
		Rights issue		Loan	
		CU'000	CU'000	CU'000	CU'000
Operating profit			20,352		
Add depreciation			7,500		
Increase in:	inventory		(5,000)		
	receivables		(1,470)		
	payables		1,032		
Net cash flow from operations			22,414		22,414
Dividends paid		(7,679)		(7,679)	
Interest paid		(1,500)		(2,700)	
			((((9,179)		(10,379)
Tax paid			(3,959)		(3,707)
Acquisition of non-current assets			(10,000)		(10,000)
Net cash outflow before financing			(724)		(1,672)
Share issue/new loan			15,000		15,000
Increase in cash			14,276		13,328
Opening cash			3,150		3,150
Increase in year			14,276		13,328
Closing cash			17,426		16,478

Interactive question 8: Financial decisions [Difficulty level: Intermediate]

Write a report to the directors that evaluates the proposed methods of financing for Max Ltd (worked example above).

See **Answer** at the end of this chapter.

Summary


Business planning
Reflects company's planning process
Standard format
– Executive summary
– History and background
– Mission and objectives
– Products/Markets/ Resources
– Financial information
– Action plan
Reorganisations
Cash forecasts
Financing requirements
– Organic growth
– Acquisition
– MBO
– Spin offs
Professional advisers
Valuations
– Asset-based
– Income-based
– Early warning signal
– Estimate a future balance sheet
– Derive cash flow for income statement and balance sheet
– Quality control is important
– Carry out analysis to explore whether a source of finance is viable

Self-test

Answer the following questions.

1 Target Company Ltd has agreed to be taken over by Purchasing Company Ltd via a share exchange whereby Target shareholders will each receive one share of Purchasing for every two they hold. No synergistic gains in earnings are expected to arise from the takeover.

Given the following pre-takeover details of the two companies and assuming the market assigns a price earnings ratio of 19 to the post-takeover company, how will the wealth of shareholders of Target and Purchasing have changed after the takeover?

	Purchasing	*Target*
Share price	CU3.00	CU1.50
P/E ratio	20	10
Shares authorised	10 million	2.5 million
Shares issued	5 million	1 million

2 Alpha Ltd is to acquire the entire share capital of Beta Ltd. The consideration is one new Alpha share for every two Beta shares. The combined group will save CU8,000 per annum on administration costs.

Extracts from the pre-merger budgets of both companies are as follows:

	Alpha	*Beta*
	CU'000	CU'000
Profit after tax	200	40
Share capital		
CU1 shares		200
50p shares	400	

What is the new budgeted earnings per share of the enlarged Alpha Ltd?

3 Pointon Ltd has made an offer of one of its shares for every two of Sidbury Ltd. Synergistic benefits from the merger would result in increased after-tax earnings of CU4m per annum.

Extracts from the latest accounts of both companies are as follows:

	Pointon Ltd	*Sidbury Ltd*
Profit after tax	CU100m	CU20m
Number of shares	400 million	100 million
Market price of shares	250p	100p

Assume that the price of Pointon Ltd's shares rises by 20p after the merger.

What will be the price-earnings ratio of the group?

4 An independent accountant has produced the following valuations of a private company:

		CUm
(1)	Historical cost adjusted for changes in general purchasing power	3.2
(2)	Piecemeal net realisable value	4.1
(3)	Cost of setting up an equivalent venture	5.3
(4)	Economic value of the business	5.6

Assume that the above valuations accord with the expectations and risk perceptions of the purchaser.

What is the maximum price that he should pay for the private company?

5 The following valuations relate to a private company. Where appropriate they reflect the expectations of the owners.

	CUm
Discounted future cash flows	3.0
Net realisable value of individual assets	2.8
Cost of setting up the business from scratch	2.6

Balance sheet value of assets	2.4

What is the minimum value that the owners would accept for all of their share capital assuming that they wish to realise their investment?

6 The following information relates to two companies, Alpha Ltd and Beta Ltd.

	Alpha	*Beta*
Earnings after tax	CU200,000	CU800,000
P/E ratio	16	21

Beta Ltd's management estimate that if they were to acquire Alpha Ltd they could save CU100,000 annually after tax on administrative costs in running the new joint company. Additionally, they estimate that the P/E ratio of the new company would be 20.

On the basis of these estimates, what is the maximum that Beta Ltd's shareholders should pay for the entire share capital of Alpha Ltd?

7 Two all-equity financed companies have identical business risks. Company R is valued at CU40 million and company S at CU8 million. The two companies merge via a share exchange which results in company R shareholders holding 80% of the shares of the new merged company.

As a result of synergy surplus assets of CU5 million are sold immediately without affecting the future profitability of the merged company. Half of the proceeds of the disposal are invested in a project with a net present value of CU1 million.

What will be the gains to the shareholders of company R?

8 An independent accountant has produced the following valuation of a private company.

		CUm
(1)	Piecemeal net realisable value	1.8
(2)	Economic value of the business	2.5
(3)	Historical cost adjusted for changes in general purchasing power	2.8
(4)	Cost of setting up an equivalent venture	3.0

Assume that the above valuations accord with the expectations and risk perceptions of the vendors.

What is the lowest price that they should consider for selling all the share capital of the company?

9 An independent accountant has used four different bases to value a company. Where appropriate they reflect the expectations and attitudes to risk of the owners.

	CUm
Economic value of the business	2.8
Net realisable value of individual assets	3.0
Cost of setting up the business from scratch	3.1
Balance sheet value of assets	3.5

In negotiations what is the minimum value the owners should be advised to accept for all of their share capital?

10 ZAPPA LTD

You have been approached for financial advice by the management of a client, Zappa Ltd, a manufacturing company. Zappa was established in 1957 and formed the platform for growth. The following information relates to the proposed financing scheme for a management buy-out of Zappa.

	%	CU'000
Share capital held by		
Management	40	100
Institutions	60	150
		250
10% redeemable cumulative preference shares		
(redeemable in ten years' time and all sold to institutions)		1,200

	1,450
Clearing bank	
Loans	700
Overdraft facilities (currently 12% per annum)	700
	2,850

Loans are repayable over the next five years in equal annual instalments. They are secured on various specific assets, including properties. Interest is 12% per annum.

Zappa is at present part of a much larger organisation, which considers this segment to be no longer compatible with its main line of business. This is despite the fact that Zappa has been experiencing growth in revenue in excess of 10% per annum.

The assets to be acquired have a book value of CU2,250,000, but the agreed price was CU2,500,000.

Requirements

(a) What is the difference between

(i) A management 'buy-in' and a management 'buy-out'?

(ii) A 'sell-off' and a 'spin-off'? **(4 marks)**

(b) Outline briefly the major advantages and disadvantages of a management buy-out.

(4 marks)

(c) Write a report to the buy-out team of Zappa Ltd appraising the financing scheme. Your report should include, *inter alia*, the cash flow implications of the proposed scheme.

(9 marks)

(d) What problems are likely to be encountered in assembling a financing package in a management buy-out of a service company, as opposed to a manufacturing company? **(3 marks)**

(20 marks)

11 BIGUN LTD

The acquisition committee of Bigun Ltd is considering making takeover bids for two competitors, Klein Ltd, a listed company, and PTT Ltd.

Summarised financial data is given below for the three companies.

Balance sheets as at 31 March 20X2

	Bigun	CUm	Klein	CUm	PTT	CUm
Non-current assets		50		8.6		6.4
Current assets	431		6.7		9.5	
Less payables: amounts						
payable within 1 year	27	16	3.0	3.7	3.9	5.6
Less payables: amounts						
payable after 1 year		193		6.04		5.55
		47		6.3		6.5
Ordinary share capital						
(50p shares)		17		5.02		2.82
Retained profit		30		1.3		3.7
		47		6.3		6.5

Notes

(1) Of which CU5m cash
(2) CU1 ordinary shares
(3) 8% debentures 20Y5 – 20Y8 currently trading at CU80

(4) 11% debentures 20X2 – 20X4 currently trading at CU110
(5) 7 year 10% bank loan

	Bigun	Klein	PTT
Average sales growth 20W8 – 20X2	8%	10%	8%
Average growth in profit after tax and interest on medium and long-term debt 20W8 – 20X2	6%	10.5%	9.5%
Average payout ratio 20W8 – 20X2	60%	40%	75%
P/E ratio at 31 March 20X2	18.4	18.6	N/a
Estimated required return on equity	9.5%	12%	13%
Profit before tax and interest on medium and long-term debt for year ended 31 March 20X2	CU10m	CU1.5m	CU1.4m

The corporation tax rate is 21%.

Requirements

(a) Prepare a report advising the main board of Bigun on the possible cost of acquiring each of the companies using a P/E method, a dividend method and an asset method to value each of the companies. **(15 marks)**

(b) Discuss alternative terms that might be offered to the shareholders of Klein and PTT, and the implications of these terms for the shareholders of Bigun. **(10 marks)**

(25 marks)

12 LAFAYETTE LTD

The directors of Lafayette Ltd, a medium-sized private company, have been approached by a large public company which is interested in purchasing their business. The directors of Lafayette Ltd have indicated that they would like to receive cash for their shares, and this is acceptable to the prospective purchaser. They have been asked by the public company to state the price at which they would be willing to sell. You have been asked to advise Lafayette Ltd.

Extracts from the last set of published financial statements for Lafayette Ltd for 20X2 are given below.

Income statement

	CU
Profit before interest and tax	5,556,962
Interest	1,000,000
	4,556,962
Taxation (21%)	956,962
Profits after tax	3,600,000
Dividends paid – preference	200,000
ordinary	1,000,000
Profits retained	2,400,000

Balance sheet as at 31 December 20X2

	CU000	CU'000
Non-current assets		
Goodwill	5,000	
Freehold property	10,000	
Plant and equipment	20,000	
Investments	5,000	
		40,000
Current assets		
Inventory	3,000	
Receivables	6,000	
Cash	1,000	
		10,000
Less Payables: amounts due within 1 year		
Payables	6,000	

		6,000
Less Payables: amounts due after 1 year		
Loan stock		10,000
		34,000
Ordinary share capital (CU1 par)	20,000	
5% preference shares	4,000	
Retained earnings	10,000	
		34,000

For the year ending 31 December 20X0, the profits before interest and tax were CU10 million and in the year ending 31 December 20X1 they were CU8 million. The owners of the preference shares have found a financial institution who will buy at a price of CU0.40 per preference share. They are willing to sell at this price.

You are asked to take the following factors into account in calculating a value per share.

(1) The prospective purchaser has agreed to purchase the debentures at a price of CU75 per CU100 stock.

(2) It has been ascertained that the current rental value of the freehold property is CU1.5 million per annum, and that this could be sold to a financial institution on the basis of offering an 8% return to the freeholder.

(3) The investments owned by Lafayette have a current market value of CU7.5 million.

(4) There is an amount of CU1 million shown in the 20X2 receivables figure which is now thought to be irrecoverable.

Two companies in the same business as Lafayette Ltd are quoted on the stock market. However, both are slightly bigger in size than Lafayette. The most recent financial data relating to the companies is given below.

	Par value per share of shares	*Market price*	*P/E ratio*	*Net dividend per share*	*Times covered*	*Yield %*
X	CU1.00	CU3.50	11.3	CU0.12	2.6	4.9
Y	CU0.50	CU1.25	8.2	CU0.04	3.8	4.1

Requirements

(a) The directors of Lafayette Ltd are naturally interested in obtaining the highest price possible for their shares. You are asked, based on the following valuation methods

(i) the net asset value
(ii) the price/earnings ratio
(iii) the dividend yield

to determine the highest possible asking price for the shares that can be justified on the basis of the available information and comment on the alternative prices you have arrived at. **(16 marks)**

(b) Advise the directors on the lowest price at which they should be willing to sell. **(4 marks)**

(c) Discuss the major factors that have contributed to the popularity of management buyouts and explain why lenders often permit high gearing ratios in MBO companies. **(10 marks)**

(30 marks)

13 JODOCUS LTD

Jodocus Ltd is contemplating the purchase of 100% of the equity of Victim Ltd, a private company. Two alternatives are being reviewed.

(1) The purchase of shares of Victim Ltd at CU5.30 cash per share; or

(2) The issue of new shares in Jodocus Ltd in exchange for the shares of Victim Ltd in the ratio of 3 Jodocus shares for 10 Victim shares.

Both Jodocus Ltd and Victim Ltd are currently financed entirely by equity. Jodocus currently has one million shares in issue with a market value of CU20 each. Victim has one million shares in issue. If Victim is acquired by Jodocus, it is believed that increased efficiency in operations will result, and that the stream of net pre-tax cash flows from operations will be CU1,800,000 per annum in perpetuity.

Corporation tax at the rate of 21% is payable in the year of occurrence. At the end of each year Victim Ltd will pay out its cash surplus after paying the corporation tax to Jodocus as a dividend. The appropriate discount rate for the cash flows generated by both Jodocus and Victim is 20%. You should assume that all cash flows occur at the end of the year in which they arise.

Requirements

(a) Compute the increase in wealth that will accrue to the existing shareholders of Jodocus under each of the two acquisition schemes. **(8 marks)**

(b) Outline the practical problems that you would expect to encounter in applying valuation models to a private company. **(5 marks)**

(13 marks)

14 GREENFINGS LTD

Greenfings Ltd (Greenfings) is a private company that owns and operates a small chain of garden centres in the Lincoln area. The company has expanded rapidly over recent years, opening new sites frequently, mainly using retained earnings to finance them. The directors have found there are significant economies of scale in operating garden centres and they are keen to expand more rapidly by extending their geographical horizons.

The directors have reason to believe that Adams Ltd (Adams) might be for sale. Adams operates ten garden centres in Nottinghamshire. The freeholds of six of these sites are owned by Adams, the other four being leased under arrangements that expire in three years' time. Adams is owned by two brothers and their families. The brothers are in their sixties and the directors of Greenfings believe that a reasonable offer would persuade the directors of Adams to sell the company.

You are the senior on the Greenfings audit and the directors have asked you, as the only person whom they know and trust and with any knowledge of the subject, to meet them to provide some idea of the issues involved with a possible deal.

During the telephone conversation, when the meeting was requested, one of the Greenfings directors said 'We are asking for this meeting because we haven't any experience of anything like this. Should we be considering this deal in the first place? Assuming that we decide to go ahead, can we get someone to help us with it? How much should we offer to Adams? How should we pay? If we have to pay in cash, how could we raise it? Is it best to buy the assets from Adams or buy all of the shares in Adams? Should we go straight to the Adams directors or get someone to act for us? Are there any other issues that you feel that we should consider?'

In preparation for the meeting you intend to make notes of the points you will raise with the directors. You are aware that the directors are people who have skills in horticulture and retailing, but not in more general business issues, particularly not in finance.

Requirement

Draft a brief set of notes of the points that you intend to raise with the directors at the meeting. Each of these points should be developed and explained clearly in a way that the directors will be able to understand. The notes should cover all of the issues raised by the director on the telephone, particularly possible sources of cash, plus any others that you feel to be relevant.

The notes need not consider factors relating in detail to the effects of financial gearing.

(15 marks)

15 MYLOSON LTD

A summary of the financial statements for the year to 31 December 20X2 is set out below.

SUMMARISED INCOME STATEMENT FOR THE YEAR TO 31 DECEMBER 20X2	CU'000
Revenue	3,744
Cost of sales	2,280
Gross profit	1,464
Operating expenses	780
Interest	72
Tax liability	200
Net profit	412
Dividends declared	163

SUMMARISED BALANCE SHEET AT 31 DECEMBER 20X2

	CU'000
Non-current assets (net book value)	1,800
Current assets	
Inventory	782
Receivables	460
Cash and bank	164
	3,206
Current liabilities	
Trade payables	324
Other payables (including dividends)	163
Financing	
Ordinary share capital (ordinary shares of CU1)	1,200
Retained profits to 31 December 20X1	550
Retentions for the year to 31 December 20X2	249
10% loan repayable 20Y8	720
	3,206

You have identified the following information:

- **Expansion plans**

  The company plans to spend CU1.2 million on new modern production equipment. This will allow current capacity to be increased and there will be a consequent increase in the number of customers serviced.

  The business is therefore expected to grow at 20% for each of the next three years. This applies to revenue and cost of sales. Costs will be tightly controlled in this period and will only rise at 10% pa.

- **Working capital control**

  The company prides itself on maintaining its control over its sales and purchase ledger. Consequently, even though there is a high growth anticipated, the company does not expect the average credit period given or taken to alter, ie sales to receivables ratio and payables to cost of sales ratio will be maintained.

  The inventory levels are not anticipated to change, as a result of the modern production techniques that will be employed.

- **Depreciation**

  The new capital expenditure will be depreciated on a straight line basis over ten years.

- **Taxation**

  The company pays tax at 21%. Capital allowances on the new equipment are available at 18% p.a. on a reducing balance basis. All of the existing capital has been written down to zero for tax purposes.

  Tax is paid in the same year in which it is charged.

- **Returns to investors**

  Dividends will grow each year in line with revenue ie 20% pa.

Requirements

(a) Using the information in the scenario:

(i) Prepare forecast income statements for the years 20X3, 20X4 and 20X5. **(7 marks)**

(ii) Prepare cash flow forecasts for the years 20X3, 20X4 and 20X5, and estimate the amount of funds which will need to be raised by the company to finance its expansion. **(9 marks)**

Notes

(1) You should ignore interest or returns on surplus funds invested during the three-year period of review.

(2) This is *not* an investment appraisal exercise; you may ignore the timing of cash flows within each year and you should not discount the cash flows.

(3) Ignore inflation.

(b) Plan a report to the directors of Myloson Ltd which:

(i) Discusses the key aspects and implications of the financial information you have obtained in your answer to part (a) of the question.

(ii) Recommends additional methods of financial forecasting which could be used with advantage by the company's management. You should assume that the only forecasts prepared by the company at present are similar to those you have prepared for your answer to part (a) of this question. **(5 marks)**

(21 marks)

16 MT

MT is a manufacturer of electrical products, with advanced information technology features. MT's results have stagnated over recent years with static sales and falling operating profit margins. Recent developments in information technology have however allowed MT to develop new lines, which the directors would like to launch on markets as soon as possible, although competition is strong. MT needs to invest in new manufacturing technology if it is to launch these products. If the products are successful, MT is in the process of developing further new lines, although these are likely to be in even tougher markets.

MT is listed on its local stock exchange and has traditionally had a mixture of debt and equity finance. Its abbreviated income statement and balance sheet for the year ended 30 April 20X5 are set out below.

ABBREVIATED INCOME STATEMENT FOR THE YEAR ENDED 30 APRIL 20X5

	CU'000
Sales	42,000
Operating profit for the year	5,500
Interest payable	1,000
Net profit before taxation	4,500
Tax (21%)	945
Net profit after taxation	3,555
Dividends proposed	1,050
Retained profit for the year	2,505

ABBREVIATED BALANCE SHEET AS AT 30 APRIL 20X5

	CU'000
ASSETS	
Non-current assets at written down values	22,500
Current assets	11,500
	34,000
EQUITY AND LIABILITIES	
Capital and reserves	
Share capital CU1 shares	4,000
Accumulated profits	10,500
	14,500
Non-current liabilities	
8% redeemable loan stock	12,500
Current liabilities	7,000

	CU'000
	34,000

The directors expect the new products to generate additional sales of CU15 million in the year ended 30 April 20X6, and that the operating profit margin on these products will average 8%. The board predicts that sales and operating profit margins will improve in subsequent years, as the new lines become established. To generate these sales, the directors estimate that CU9 million will need to be invested. The directors intend to raise these funds, either:

(a) By a rights issue of CU1 ordinary shares at a premium of CU2 per share

(b) By an issue of 10% loan stock at par

Even if the rights issue is chosen, MT's board would prefer to maintain a constant dividend payout ratio.

Current loan stock holders have indicated to the directors that they are unhappy with MT taking on more debt, as they believe shareholders will benefit at their expense. Certain major shareholders have also expressed concern that although dividends are linked with the results MT achieves, there appears to be no link between directors' remuneration and results.

Requirements

(a) For each of the financing options

(i) Prepare a forecast income statement for the coming year

(ii) Calculate the forecast earnings per share for the coming year

(iii) Calculate the projected level of gearing at the end of the coming year.

Assume there will be no changes in results and balance sheet other than those arising from the extra sales and additional finance. **(12 marks)**

(b) Discuss why the interests of loan holders may conflict with those of shareholders and instances where their interaction may not conflict and explain how loan stock holders can affect how a company achieves its key financial objectives. **(5 marks)**

(17 marks)

CHAPTER 8

17 HIGHGATE LTD

Highgate Ltd expects to have a competitive advantage over its competitors for a period of four years. The following forecasts relating to the value drivers for this competitive advantage period have been created.

Year	*1*	*2*	*3*	*4*
Sales growth %	10	8	5	3
Operating profit margin (post depreciation) %	10	12	12	12
Incremental non-current asset investment (as a % of sales increase)	6	4	2	2
Incremental working capital investment (as a % of sales increase)	4	3	2	2

The following information is also relevant.

- Current sales for the year are CU550m
- Tax on profits is expected to be paid at a rate of 21% for the foreseeable future
- Shareholders require a return of 8% per annum
- Non-current assets will also be sold during the first year and receipts are estimated to be CU12 million
- The present value at the end of year four of the free cash flows for the period following the competitive advantage period can be estimated by applying a multiple of 13 to the year four cash flow

- No short-term investments are held
- Debt with a market value of CU225m is held by Highgate Ltd
- Highgate Ltd has 50m CU1 shares in issue

Requirement

Calculate the value of a Highgate Ltd share using the SVA approach. **(10 marks)**

Now go back to the Learning Objectives in the Introduction. If you are satisfied you have achieved these objectives, please tick them off.

Answers to Interactive questions

Answer to Interactive question 1

		CUm
Value of A and B combined	$\frac{\text{CU}20\text{m}}{0.16}$	125
Value of A on its own	$\frac{\text{CU}15\text{m}}{0.20}$	(75)
Maximum price for B's shares		50

Answer to Interactive question 2

Year	0	1	2	3	4	5
	CUm	CUm	CUm	CUm	CUm	CUm
Operating cashflow		1.000	1.000	1.000	1.000	1.000
Sale of head office	2.000					
Synergistic benefits		0.200	0.200	0.200	0.200	0.200
Disposal						5.000
Net cashflow	2.000	1.200	1.200	1.200	1.200	6.200
PVF at 20%	1.000	0.833	0.694	0.579	0.482	0.402
Present value	2.000	1.000	0.833	0.695	0.578	2.492

Present value	CU7.598m
Less value of loan stock	(CU1.500m)
Maximum value of Target	CU6.098m

Notes

(1) The estimated disposal value of Target is included to compensate for Arrow's short planning horizon. It is assumed that the estimated disposal value is an approximation of the present value of cashflows from year 6 onwards.

(2) The present value of the cash inflows is CU7.598m. This is generated by a company funded by equity and debt. Therefore, the market value of loan stock has to be deducted from the total value of the business to arrive at an equity value.

Answer to Interactive question 3

Valuation of 200,000 shares = 200,000 × P/E ratio × EPS

$$= 200{,}000 \times 12.5 \times \frac{\text{CU}87{,}200 - 20{,}000}{400{,}000}$$

= CU1,045,000

This amount would then, typically, be reduced by $^1/_2$ to $^1/_3$ to reflect the difficulty in selling these shares.

Answer to Interactive question 4

				CUm
(a)	Combined value	= CU75m × 18	=	1,350
	Price Ltd on its own	= CU50m × 20	=	(1,000)
	Maximum amount			350
(b)	Current value of Maine Ltd	= CU20m × 15	=	300

This is likely to be the minimum price. Anything between CU300m and CU350m splits the additional CU50m (1,350m – 1,000m – 300m) between both sets of shareholders.

Answer to Interactive question 5

(i) Constant dividend P0 = $\frac{£CU0.25}{0.2}$ = CU1.25

(ii) Constant growth in dividend P0 = $\frac{£CU0.25 \times 1.05}{(0.2 - 0.05)}$ = CU1.75

(iii) Present value of five years' dividend of CU0.25 pa = CU0.25 × 2.991 = CU0.748

Plus

Present value of growing dividend from year 6 onwards $\frac{£0.CU \times 1.05}{(0.2 - 0.05)} \times \frac{1}{1.2^5}$ = CU0.703

CU1.451

(iv) Present value of five years' dividend of CU0.25 pa = CU0.25 × 2.991 CU0.748

Present value of CU2.00 in five years' time = CU2.00 × $\frac{1}{1.2^5}$ CU0.804

CU1.552

Answer to Interactive question 6

Seller: They will want to ensure that the amount offered from the managers is backed up by a reliable financial package. Work by their financial advisers and lawyers will help to ensure that the finance is in place. There may be other, lower bidders. Whilst those alternative offers may be lower, the finance may be more easily available if the bidder is a large organisation with liquid assets.

Managers: The attractions of an MBO are:

- Independence
- Financial reward
- Motivation

The risks however are:

- Lack of support from within the business and also from suppliers and customers.
- Lack of skills within the business if key employees leave
- Financial risk. If business profits fall even by a little, it might become impossible to service the large amount of debt.

VC: The objective will be to make a very high financial return. This is typically achieved by selling the business within three to five years, by flotation or otherwise.

The VC will not be assured that the value of their shares will be as high as they want.

Their downside risk is typically managed by:

- Having board representation
- Investing a mixture of debt and equity
- Including convertible terms in the debt, such that debt converts into a higher equity share in the event that the company on subsequent sale is worth less than originally envisioned.

Bank: The bank will manage their risk by investing in senior debt, ie debt which ranks higher than other debt in terms of interest, security and repayment.

The bank might also want personal guarantees from the buyout team.

Alternative presentations for Worked example: Financial statement forecasting

Loumar Ltd

Appendices

1 **Cash receipts and payments**

	20X7 CU'000	20X8 CU'000	20X9 CU'000
Receipts			
Cash from sales			
(revenue + opening receivables – closing receivables)	1,697	1,867	2,052
Payments			
For purchases (cost of sales + opening payables – closing payables)	1,032	1,135	1,247
Operating expenses	341	358	376
Additional inventory purchase	35		
Machinery	500		
Interest (current year)	30	30	30
Tax (current year)	44	58	72
Dividends (previous year)	85	106	133
	2,067	1,687	1,858
Net cash flow	(370)	180	194
Cash/(deficit) b/f	73	(297)	(117)
Cash/(deficit) c/f	(297)	(117)	77

Answer to Interactive question 7

(a) (i) There is no information about the cost of loan interest, and it is assumed that this cost is included within other expenses.

MYLOTIC LTD
FORECAST INCOME STATEMENT FOR THE YEAR TO 30 NOVEMBER 20X3

	CUm	CUm
Revenue (CU240m × 1.25)		300.0
Cost of sales (70%)		210.0
Gross profit (30%)		90.0
Expenses	54.6	
Depreciation of buildings (5% of CU20m)	1.0	
Depreciation of plant and machinery (20% of CU(25m + 57m))	16.4	
		72.0
Profit before taxation		18.0
Taxation (21%)		3.8
Profit after taxation		14.2
Dividend (50%)		7.1
Retained profit		7.1

(ii) MYLOTIC LTD
FORECAST BALANCE SHEET AS AT 30 NOVEMBER 20X3

	CUm	CUm	CUm
Non-current assets			
Freehold buildings at cost		24.4	
Less accumulated depreciation		5.4	
			19.0
Plant and machinery at cost		94.9	
Less accumulated depreciation (12.9 + 16.4)		29.3	
			65.6
			84.6
Current assets			
Inventory (39 – 18)		21.0	
Trade receivables (W1)		75.0	
		96.0	
Payables: amounts falling due within one year			
Bank overdraft (W4)	22.9		
Trade payables (W2)	24.0		
Dividend payable	7.1		
		54.0	
			42.0
			126.6
Payables: amounts falling due after more than one year			
Loan (W3)			31.5
			95.1
Share capital and reserves			
Ordinary shares of CU1			20.0
Accumulated profits (68 + 7.1)			75.1
			95.1

WORKINGS

(1) **Trade receivables**

Average debt collection period in year to 30.11.20X2 = (20/240) × 12 months = 1 month.

Average debt collection period in year to 30.11.20X3 = 3 times one month = 3 months.

Trade receivables as at 30 November 20X3 = (3/12) × CU300 million = CU75 million.

(2) **Trade payables**

Purchases in the year = closing inventory + cost of sales – opening inventory.

Purchases are therefore (given an CU18m reduction in inventory levels)

21m + 210m – 39m = CU192 million.

Trade payables at 30.11.20X3 = (1.5/12) × CU192 million = CU24 million.

(3) **Loan**

	CUm
Share capital	20.0
Reserves as at 30 November 20X2	68.0
Retained profit, 20X3	6.5

Share capital and reserves at 30.11.20X3	94.5
Loan at 30.11.20X3 (one-third of CU94.5m)	31.5
Original loan	57.0
Loan repaid in the year	25.5

(4) **Cash**

Tutorial note. The cash balance in the balance sheet can be calculated as the 'missing figure' to make the balance sheet net assets equal the share capital and reserves. A proof of the cash position, however, is shown here.

	CUm	CUm
Operating profit		18.0
Add back depreciation (1.0 + 16.4)		17.4
		35.4
Reduction in inventory	18.0	
Increase in receivables (75 – 20)	(55.0)	
Increase in trade payables (24 – 16.5)	7.5	
		(29.5)
Cash flow from operations		5.9
Tax paid		(3.8)
Dividends paid		(7.8)
Machinery purchase		(57.0)
Loan raised		57.0
Loan repaid		(25.5)
Cash flow in the year		(31.2)
Cash at start of year		8.3
Cash at end of year		(22.9)

(b) Liquidity is expected to deteriorate. The company is forecasting a bank overdraft of CU22.9 million at the end of November 20X3, compared to a positive cash balance the previous year. The company will have to ensure that bank overdraft facilities are available if it goes ahead with its plan to increase sales.

The company will also have some long-term debt capital, having been ungeared in the year to 30 November 20X2.

On the basis of the forecasts, it is questionable whether there is any financial benefit to be obtained from expanding sales, and the company management should review its plans urgently, before implementing them.

Answer to Interactive question 8

To: The directors of Max Ltd
From: Consultants

This report outlines the advantages and disadvantages of the two financing methods and gives a consideration of **alternative methods**.

These figures illustrate some of the following characteristics of equity and debt financing.

Dilution of share ownership

A share issue may alter the **disposition of power** in the ownership of the company, reducing the influence of the original shareholders. Because it is risk-bearing capital, and dividend payouts are not tax deductible, **equity finance** is **expensive** compared with the direct cost of debt. It also has **very high issue costs** because of the legal requirements that must be observed. A share issue will often cause a fall in EPS, especially in the early years of a new investment. However, the advantage is that **gearing** is **reduced**, which improves the **stability of equity earnings**, reducing shareholders' financial risk and lowering the return that they demand from their investment.

Direct issue costs

Debt finance will not cause any dilution of shareholding and, because interest payments are more predictable than dividends and are an allowable expense for tax purposes, debt has a **cheaper direct cost** than equity finance. The additional profit generated from the investment will therefore **enhance expected EPS**. However the increase in gearing and interest payments will cause shareholders' returns to drop markedly if profits do not materialise, increasing their financial risk and causing an increased cost of equity capital. Floating rate debt brings the added problem of possible significant increases in future interest rates, referred to as interest rate risk.

Profit uncertainty

In general, if the new project has highly uncertain or volatile predicted profits, **equity finance may be preferred** because **financial risk for existing shareholders may become too high if debt finance is used**. Gearing that is too high may also increase bankruptcy risk, with its attendant costs. Debt finance may be preferred for projects with more stable profit and cash flow profiles, because of its cheap direct cost.

Tax shield

However, **financial theory** shows that the combined effects of the advantages and disadvantages listed above create very little difference between the **effect of equity and debt finance** on company value. If anything, debt has an advantage if the company is not highly geared and can take advantage of interest payments as a tax allowable expense, but it has been argued that this **'tax shield'** effect of debt is overstated, and this will certainly be the case when interest rates are low.

Retained earnings

As a purely practical method of financing projects, **'pecking order theory'** shows that financial managers will normally look to **retained equity earnings** as a first source of capital for expansion. This implies that companies wishing to expand will normally have low dividend payouts. The advantage of using retained earnings is that there are **no issue costs** and **no prospectus** or **other requirements** for reporting to investors. Only when retained earnings have been fully utilised will companies look to the **next source of finance**, which is normally **borrowing**, because of the speed at which it can be arranged compared with share issues, its relatively low issue costs and the many different forms it can take, which can often be tailored to the company's needs. Share issues are reserved for **very large expansions or acquisitions**. Because of their high issue costs and the onerous legal requirements, they cannot be carried out too often.

Variations on borrowing

For example, **convertible debt** gives the holder an option to convert from debt to the company's shares, and **warrants** (options to buy the company's shares at a fixed price) can be **linked to debt** issues. Both of these methods succeed in **reducing the interest cost of debt** to the company but may become more expensive in the long run if the options are exercised, resulting in the effective issue of cheap shares. Types of debt instrument have grown greatly in number in the last few decades. Swaps enable fixed rate debt to be converted to floating rate or *vice versa*. Futures and forward debt contracts can be arranged and, as in our case, options can be purchased to provide caps (maximum interest rates) or collars (maximum and minimum interest rates).

Other sources of finance

We might also consider **acquisition of the new assets by hire purchase or lease finance,** sale and leaseback of existing property, or raising finance from our working capital, for example by factoring our debts or invoice discounting, or by negotiating purchase finance for inventory.

Answers to Self-test

1 Shareholders' wealth of Purchasing = 5m × CU3
= CU15m

Shareholders' wealth of Target = 1m × CU1.5
= CU1.5m

Combined earnings = $\frac{\text{CU}3}{20} \times 5\text{m} + \frac{\text{CU}1.5}{10} \times 1\text{m}$

= CU0.9m

New value of company = 19 × CU0.9m
= CU17.1m

Purchasing shareholders' wealth change = $\frac{5}{5.5} \times \text{CU}17.1\text{m} - \text{CU}15\text{m}$

= CU0.545m

Target shareholders' wealth change = $\frac{0.5}{5.5} \times \text{CU}17.1\text{m} - \text{CU}1.5\text{m}$

= CU0.055m

Both have gained.

2 EPS = $\frac{200 + 40 + 8}{(400 \times 2) + (200 \div 2)}$

= CU0.2756

= 27.56p

3 Number of shares in issue = 400m + 50m
= 450m

Earnings = CU(100m + 20m + 4m)
= CU124m

EPS = $\frac{\text{CU}124\text{m}}{450\text{m}}$

= CU0.2755

Price per share = CU2.70

P/E ratio = $\frac{2.7}{0.2755}$

= 9.80

4 If the purchaser wants the business but does not buy the company, the price he would have to pay is CU5.3m, the cost of setting up an equivalent venture. This assumes that the CU5.3m includes the cost of goodwill.

5 Balance sheet value is irrelevant.

Set up from scratch is assumed to exclude goodwill and is irrelevant.
DCF value cannot be immediately realised.
NRV is their only realistic alternative, ie CU2.8m.

6 Value after merger (CU'000) = (200 + 800 +100) × 20
= 22,000

Value Beta pre-merger (CU'000) = 800 × 21
= 16,800

Value of Alpha (CU'000) = 5,200, ie CU5.2m

7 Value of merged company = CU(40m + 8m + 5m + 1m)
= CU54m

New value of company R = CU54m × 80%
= CU43.2m

Gains to shareholders = CU43.2m – 40m
= CU3.2m

8 Unless they definitely need to sell now they should not consider an offer less than the present value of the firm's future receipts, ie CU2.5m.

9 The best alternative for the vendors is the NRV, ie CU3.0m.

10 ZAPPA LTD

(a) **Terms**

In a buy-in the managers who are doing the buying are not existing managers in the firm which is selling part of its operation.

In a buy-out the managers work for the firm, usually in that part which is the subject of the sale.

A sell-off involves selling part of a firm's business, perhaps to another firm, perhaps to the managers.

A spin-off involves dividing the operations of the existing firm into two (or, possibly, more) parts by creating a new firm (or firms) to take responsibility for the spun-off part. Shareholders are given shares in this new firm (or firms) in proportion to the shares which they originally own in the original firm. Thus the shareholders own the same assets, but through two (or more) separate shareholdings.

(b) **Advantages and disadvantages of a management buy-out**

Advantages	Disadvantages
Have been successful in recent years.	Complicated financing packages due to the managers' inability to raise all the cash themselves.
Managers know and understand the business.	Heavy debt burden.
Managers are committed to its success.	Loss of head office support and services.

(c) **Report**

To Buy-out team of Zappa Ltd
From An Analyst
Date Today
Subject MBO financing scheme

Overview

The financing scheme involves the purchase of assets with a net book value of CU2,250,000 for an agreed price of CU2,500,000. The finance raised will provide funds of CU2,850,000 made up as follows.

	CU'000
Ordinary shares	250
Preference shares	1,200
Loan	700
Overdraft	700
	2,850

Of the funds raised, only CU350,000 will be available to the business after the purchase price has been paid. This will be in the form of unused overdraft facilities.

Gearing

As is common to MBOs the gearing level will be very high

$$\frac{1{,}200+700+700}{250} = 1{,}040\%$$

There is only CU250,000 of equity compared with CU2,600,000 of debt finance (including the preference shares and all of the overdraft as debt). The gearing level will mean that the returns to equity will be risky, but the buy-out team owns 40% of a CU2.5 million company for an investment of only CU100,000. The rewards are potentially very high. Careful monitoring of cash flow will be vital.

One consequence of this level of gearing is that it will be difficult to raise any additional finance. There are unlikely to be any assets that are not secured, and in any event the level of interest and loan repayments would probably prohibit further borrowing.

Cash commitments

The following is a summary of the annual cash commitments from the financing structure.

(i) **Loan repayments**

Annual payments will have to be made in the repayments of capital and interest on the CU700,000 loan. The annual amount will be:

$$\frac{\text{CU}700{,}000}{3.605^{*}} = \text{CU}194{,}000$$

* The annuity factor for five years at 12%.

(ii) **Redeemable cumulative preference shares**

The preference shares will require on average of CU120,000 to be paid every year. There is a little flexibility, in that if the dividend cannot be met it can be postponed (but not avoided).

The redeemable preference shares will have to be repaid after ten years. This can be provided for over the ten years, or an alternative source of finance found to replace the funds. Assuming that they are to be provided for according to the terms of the financing package, this will require a further cash outflow of up to CU120,000 per annum, depending upon the rate of interest on the sinking fund.

(iii) **Overdraft**

The element of the overdraft used to finance the purchase price is effectively a source of long-term finance. The rate of interest is currently 12%; at this rate CU350,000 drawn down will cost CU42,000 per annum.

In total there will be a commitment to pay approximately CU476,000 per annum. This will be the first priority of the new company. The management team will need to generate sufficient funds from the only available source – operations – in order to meet this commitment.

Other cash commitments

Apart from the need to generate cash to satisfy the parts of the financing scheme, the company will also need to generate funds to invest in working capital and non-current assets as required. At the moment these capital needs are unknown. In the context of 10% annual growth in revenue, however, they might exceed the unused element of the overdraft facility.

Institutional involvement

By virtue of their 60% interest in the ordinary shares of the company, the financial institutions hold the controlling stake. They also hold all of the preference shares. Consequently, the institutions will be able to determine many aspects of the company's management, including the appointment of directors. Institutional board representation is also probable.

The institutions are likely to have two overriding objectives.

(i) **The security of loan and interest repayments**

Any breach of the loan arrangements might trigger the appointment of administrators or receivers, and the investment of the institutions would almost certainly be lost.

(ii) **Realising their equity investments**

The institutional investors will probably expect to realise their investment in a relatively short time frame. This is commonly set at between five and seven years, and management need to make plans for an exit route, probably by planning a flotation at that time.

Profit growth

Apart from the need to generate cash as noted above, the company must also generate steady profit growth. The institutional investors will require a history of profit growth in order to enable the disposal of their stake through flotation or a trade sale.

Conclusion

The financing scheme will place a heavy cash burden on the company, particularly in the early years. The involvement of the institutions will perhaps prove unwelcome, but the MBO would be impossible without accepting it.

(d) **Financing packages for service company MBOs**

There are three main problems particular to arranging a finance package for a service company.

(i) **The lack of tangible assets**

Because MBOs normally have to be highly geared, there is a need to provide security for the loans in a package. Service companies commonly have a very low level of tangible assets. It will therefore be difficult to attract much debt finance. Mezzanine finance may be helpful.

(ii) **'People' businesses**

The success of service companies depends on their staff. Institutions tend to view such success with suspicion because people, unlike plant and equipment, can resign. Unless the people in question are tied into the company within the MBO financing package by, for example, insisting on their investing in equity, there is little guarantee that they will stay with the company. Service contracts may be required.

(iii) **Working capital**

The nature of most service companies is that they have unusually high working capital needs. The main expense for a service company is staff costs. It is almost impossible to take extended credit from staff without losing their services. The supplies of service companies often involve a long period of work before customers can be billed. Consequently, a finance package would have to provide for the working capital: working capital finance is particularly risky because it is difficult to secure and so may be equally difficult to raise.

11 BIGUN LTD

(a) **Report**

To The Directors, Bigun Ltd
From Anna Liszt
Date Today
Subject Cost of possible acquisitions by Bigun Ltd

1 **Terms of reference**

The following report estimates the values of Klein Ltd and PTT Ltd.

2 **Summary**

The following table gives estimates of the possible values of the two companies.

Valuation basis	*Klein Ltd*	*PTT Ltd*
P/E ratio	CU12.4m	CU12.5m
Dividend valuation	CU19.6m	CU15.8m
Net asset value	CU6.3m	CU6.5m

Because these valuations are based on estimates they must be seen as guides only and should be interpreted with reference to the assumptions lying behind their calculation. Details of the calculations are given in the appendix.

3 **Klein Ltd**

The P/E ratio approach for Klein Ltd is the best estimate of market value available because it is based on actual earnings and the observed P/E ratio. It will give actual market value at 31 March 20X2. Note, however, that the situation of Klein might have changed significantly since that date. The dividend valuation approach gives a higher valuation for Klein, but the assumption that investors expect past growth to continue into the future is questionable. It is not clear from the information supplied how the required return in equity was estimated, and this too will affect the valuation.

The asset valuation is of little worth, being based on historical book values with no indication being given of current values, goodwill, etc.

4 **PTT Ltd**

PTT is not a quoted company and therefore any estimate of its value will be somewhat subjective.

The dividend valuation is CU15.8m but once again caution must be exercised due to the difficulty in estimating growth and the estimate of the required return on equity.

The P/E ratio approach needs caution as the multiple of Klein Ltd (a quoted company) has been used. It is usually considered that non-quoted firms should have much lower P/E ratios and a reduction of up to 50% on this valuation is possible.

For similar reasons as those given for Klein Ltd the asset value of PTT Ltd is of limited use.

5 **Conclusions**

All of the above figures should be seen as educated guesses. The final price paid will depend on how much each party wishes to sell and how badly Bigun Ltd wishes to buy. The estimates of CU12.4m and CU15.8m for Klein and PTT respectively are probably the best guide but premiums of up to 25% on current market price are not uncommon, rising to 50% plus if the bid is contested.

6 **Appendix**

Klein Ltd

(1) **P/E ratio approach**

EPS x P/E ratio = Market value per share

$$\text{Current EPS} = \frac{(£^{cu}.5m - (£^{cu}m \times 11\%)) \times 0.79}{5m \text{ shares}} = CU0.13272$$

P/E ratio (given) = 18.6

Market price per share on historic EPS = CU0.13272 × 18.6 = CU2.47

Total value of Klein equity = CU2.47 × 5m shares = CU12.4m

(2) **Dividend valuation**

D_0 = EPS × proportion paid out as dividend
= CU0.13272 × 40%
= CU0.0531

$$P_0 = \frac{D_0(1+g)}{ke-g}$$

$$= \frac{0.0531 \times 1.105}{0.12 - 0.105}$$

= CU3.91 per share

Therefore total value = CU3.91 × 5m
= CU19.6m

PTT

(3) **Dividend valuation**

$$D_0 = \frac{(\text{CU}1.4\text{m} - (\text{CU}5.5\text{m} \times 10\%)) \times 0.79 \times 0.75}{2.8\text{m shares}}$$

= CU0.1799 per share

$$P_0 = \frac{D_0 (1+g)}{(ke-g)}$$

$$= \frac{0.1799 \times 1.095}{0.13 - 0.095}$$

= CU5.63 per share

Total value of PTT = CU5.63 × 2.8m = CU15.8m

(4) **P/E valuation – using P/E ratio for Klein Ltd**

EPS = CU0.2399 (that is $D_0 \times \frac{1}{0.75} = 0.1799 \times \frac{1}{0.75} = 0.2399$)

CU0.2399 × 18.6 = CU4.46 per share

Total equity value of PTT Ltd = CU4.46 × 2.8m
= CU12.5m

(b) **Terms to be offered by Bigun Ltd**

The terms that may be offered partly depend upon the sum of money involved. Let us assume that both companies are bid for at a total cost of CU12.4m + CU15.8m + a premium, say, CU32m in total.

The following terms could be used.

A cash offer

This has the advantage that all parties are assured of the sum received. However it could mean that the shareholders in the victim companies will have to pay capital gains tax almost immediately. Further, Bigun Ltd only has CU5m of cash, and borrowing or an equity issue would be required to raise the remainder of the cash.

A loan for share exchange

Bigun Ltd could offer to exchange loan stock in return for the shares of the victim companies. This would give the victim shareholders a fairly safe income stream and not expose them to immediate capital gains tax. It would, however, prevent them from participating in future profit growth and this might not be popular.

From the viewpoint of Bigun Ltd it would cause a significant increase in gearing which might be of concern to existing investors.

A share-for-share exchange

Bigun Ltd could offer to exchange new shares for the existing shares in Klein and PTT. At a current market price of CU3.62 (EPS 19.70p × P/E ratio 18.4) and a bid of CU3.2m, this would require the issue of approximately 12.2m shares.

The current equity earnings of Klein and PTT is as follows.

(PBIT – Interest on payables more than one year) × (1 – tax rate)
= [1.5m + 1.4m – (6.0 × 11%) – (5.5 × 10%)] × 0.79
= (2.9m – 1.21m) × 0.79
= CU1,335,100

The current EPS of Bigun Ltd is 19.70p, whereas the incremental EPS on the new shares is only

$$\frac{\text{Current equity earnings of Klein and PTT}}{\text{8.8m shares}} = \frac{\text{CU}1,335,100}{8,800,000} = 15.17\text{p}$$

This would result in a reduction in EPS (and possibly market value) of Bigun shares.

Overall each of the various packages presents problems. Bigun shareholders might not be happy with a cash offer because of liquidity problems, whereas the use of loan stock could drive gearing to an unacceptable level. An equity issue could result in a reduction in EPS though much would depend upon the combined earnings of the three companies. A compromise solution often adopted would be to use a mixture of the above packages, for example a cash and equity offer.

12 LAFAYETTE LTD

(a) **Business valuations**

(i) **Asset basis**

		CU'000	CU'000
Revalued assets	Goodwill	5,000	
	Property (1.5m/0.08)	18,750	
	Plant	20,000	
	Investments	7,500	
	Receivables	5,000	
	Inventories	3,000	
	Cash	1,000	
			60,250
Less	Debenture payment	7,500	
	Payables	6,000	
	Assets of preference shareholders	4,000	
			(17,500)
			42,750
Number of equity shares			20m
Price per share (CU42.75m / 20m)			2.14

(ii) **P/E ratio**

Earnings per share (20X2)

$$= \frac{\text{Earnings after tax and pref divs}}{\text{Number of shares}}$$

$$= \frac{\text{CU}3.4\text{m}}{20\text{m}} = \text{CU}0.17$$

Average P/E ratio for X and Y = 9.75

	CU
Suggested price = CU0.17 × 9.75 =	1.66
Less reduction for non-marketability (25% say)	0.42
	1.24

(iii) Dividend yield

(Dividend 20X2 ÷ Number of shares) = (CU1m ÷ 20m) = CU0.05

Average gross dividend yield for X and Y = 4.5%

	CU
Suggested price = CU0.05 ÷ 0.045	1.11
Less reduction for non-marketability (25%, say)	0.28
	0.83

(iv) **Comment**

There is clearly a big difference between the value per share arrived at on an asset basis and one based on earnings. The highest price is CU2.14 but the purchaser may not be willing to accept this. It is based on the market value of the freehold property which presumably is needed by Lafayette in order to continue in business. It also includes a valuation for goodwill, an intangible asset. If the goodwill valuation is excluded, which might well be justified as the profits from Lafayette are falling and the property is kept at its balance sheet value, the asset basis shows the following valuation.

	CU'000
Property	10,000
Plant	20,000
Investments	7,500
Current assets	9,000
	46,500
Debentures, payables, preference shareholders, as before	17,500
	29,000

This is CU1.45 per share, which is reasonably close to the prices arrived at by the P/E ratio and dividend yield methods before the reduction for non-marketability. A price of CU1.50 or CU1.60 would appear to be a reasonable price, but in the negotiations Lafayette should start by asking for a higher figure, nearer to the CU2 per share based on asset values under one set of assumptions, namely break-up value (see below).

(b) **Lowest price at which the directors should sell**

The earnings based figures calculated in (a) above are calculated using market ratios from similar quoted companies, adjusted to reflect the non-marketability of Lafayette shares. The earnings figures used are the 20X2 figures. However, a potential purchaser will be interested in *future* maintainable earnings and the experience of the last three years suggests these may continue to fall. Any earnings based share price is therefore likely to be lower than those calculated above.

In view of the low earnings based valuations and the higher asset based valuation the directors of Lafayette would be advised to consider the break up value of the business as the lowest possible price. As the directors wish to receive cash for their shares – that is, realise their investment – it may be better to sell off the assets rather than sell the business as a going concern.

Further work is required to ascertain the net break up value of the business after disposal costs and taxation (for example, what is the disposal value of the plant and machinery?) but this figure should be regarded as the 'worst case scenario' for the directors and, therefore, the lowest figure they should be prepared to accept.

(c) **Factors contributing to the popularity of management buyouts**

For several decades leading up to the early 1980s there was rapid growth in the size of many companies. The perceived benefits of economies of scale and servicing an expanding global market fuelled this growth.

However the recession of the 1980s and the rapid change of consumer preferences led to a need for firms that serviced 'niche' markets. These firms were able to change quickly with consumer desires. Consumers often sought high quality and innovation rather than high volume. This cultural change from large to small enterprises servicing specialised rather than general markets has probably been the major factor in the growth of management buyouts.

Other contributing factors to this increase can be considered from the viewpoint of the company that is selling and the management team that is buying.

Vendors

If the company to be sold is part of a group, the following benefits can arise

(i) Divestment of an area of business that is peripheral to its main business or no longer fits its overall corporate objectives,

(ii) Cash flow benefits from the disposal – either as a name of reinvestment in other, more suitable, areas or to reduce overall corporate borrowing.

If the company to be sold is privately owned

(i) Realising capital locked up in the business either on retirement, death or lack of successors,

(ii) The disposal to a trusted team who will maintain the firm with the same identity (often a matter of concern to founders of a business) and should minimise any redundancies that result from the sale.

In general terms the sale to a known team should minimise any risk of disruption to client relationships and the confidential information that will otherwise have to be given to prospective buyers.

Lastly the vendors may have no choice but to sell to the managers if no other purchaser is available.

Management team

Reasons for planning a buyout may include

(i) A wish to control their own destiny and share more directly in the success of the business

(ii) Freedom from group constraint on decision-making and strategic planning

(iii) The possibility of a buyout being the management team's only alternative to redundancy

(iv) Opportunity to continue to use existing skills in a changing business environment for the group

(v) The apparent success of other buyouts leading to flotation on the AIM and substantial wealth benefits accruing to the management team.

The most recent cases of management buyouts are predominantly a result of the divestment by a parent company of areas of business that no longer suit their overall corporate strategy.

Reasons for lenders allowing high gearing ratios

Any lender is concerned with the risk and return associated with the decision to lend. In a buyout situation, debt to equity ratios of 5 to 1 are not uncommon. This is a gearing level much greater than generally accepted banking ratios.

Put simply, the degree of gearing will be limited by the company's forecast ability to pay capital and interest on loans. Additionally some security for these loans will also be sought. This security may be on the assets of the business and personal guarantees from the buy-out team. It is not unusual for financiers to seek the assignment of life assurance policies on 'key employees'. Finally the security may be enhanced by taking an equity stake in the business and hence exercising some direct management control.

The major concerns for the providers of finance can be summarised as follows.

(i) What is the nature and condition of the company's assets both physical and human?

(ii) What is the expected cash flow and profitability?

(iii) Will the high levels of gearing be reduced, within a reasonable amount of time (3 to 5 years)?

(iv) Are there any taxation benefits accruing from underutilisation of debt capacity?

Essentially financiers are looking for a reasonable return given the risks of their investment. In many buyouts the confidence of the financiers in the ability of the management team has been a major factor in determining the high levels of gearing that are commonly seen.

13 JODOCUS LTD

(a) **Increase in existing shareholders' wealth**

Value of extra earnings = PV of earnings post-tax at discount rate appropriate to business risk

Extra value to Jodocus

$$= \frac{CU1.8m \times 0.79}{0.2} = CU7.11m$$

(1) **Purchase of Victim's shares**

$$\text{New market price per share} = \frac{£CUm + £7CU1m - £CUm}{1m} = £2CU81$$

Increase in wealth for Jodocus shareholders = CU1.81

(2) **Share exchange**

$$\text{New market price per share} = \frac{£1m + £7m}{(1m + 0.3m)} = CU20.85$$

Increase in wealth for Jodocus shareholders = CU0.85 per share

(b) **Practical problems of valuation models and private companies**

The valuation model used to value a private company will depend on whether a minority holding or majority holding is to be valued. A minority shareholding may be valued by using a dividend basis possibly by a dividend growth model where the market value of equity is assumed to be

$$P_0 = d_0 \frac{(1+g)}{(Ke-g)}$$

Alternatively a simpler approach using conventional views of dividend yield might be appropriate. The practical problem arises in attempting to estimate g and k_e. The anticipated annual future growth rate may be estimated by past growth or using the earnings retention model. Both models, however, use past data to predict future growth.

A company's cost of equity may be estimated using a quoted company with the same capital structure in the same business risk class. However, in practice some adjustment should be made for the increased risk in investing in a private company as it will tend to be smaller and less diversified. The same problems arise in the necessary adjustment to the dividend yield of a quoted company, if it is to be applied to a private company's latest dividend in order to value that company.

In valuing a majority holding there are again a number of different models reflecting control of dividend policy and/or assets. First, a model can be used which is based on the assumption that the value of a company's equity is the present value of the future earnings stream. As for the dividend model, problems arise in estimating growth in earnings and estimating a discount rate to reflect the risk of those earnings.

A similar quoted company's current earnings yield or price earnings ratio may be applied to the company's current earnings. However again an adjustment should be made to reflect the lower marketability of the shares. An acquiring company will also need to consider any synergistic benefits that may arise.

Problems also arise in using an asset-based value. Balance sheet values are based on historical costs and are unlikely to be useful in valuing a company. Service companies have relatively small investments in tangible assets and if the company is a going concern it would be inappropriate to apply an asset-based value to such a company, even if the replacement cost of those assets was used, as this does not reflect the goodwill the company's activities may have generated. The net realisable value could be used for a company as a guide to a minimum price, particularly if the company were in financial difficulty and unable to continue in its own right. However, particular problems arise in valuing specialised equipment fairly.

Inevitably a range of different models will give different valuations and it is always a process of negotiation between the minimum the target company's shareholders will accept and the maximum the acquiring company's shareholders will pay. Part of that process of negotiation will involve determining a method of discharging the purchase consideration. For instance, in a takeover where the consideration may be mainly for cash or loan stock the target company's shareholders will take no further part in the control of the business. However, in a merger, both companies' shareholders will continue to be actively involved in the company's operations and as such may place a different value on their holdings.

14 GREENFINGS LTD

Financing and other issues relating to a takeover by one small company of another.

Lifecycle phase

At this stage in the lifecycle of the business, takeover may well be a sensible way to grow. It may, however, represent too large an incremental jump in the scale of operations, and the company's directors should carefully consider whether organic growth might be more appropriate.

Advice

Most companies, particularly the smaller entities, need advice in areas like this. Takeovers are likely to be once-in-a-lifetime events, and it is unlikely that expertise is present 'in house'. Relatively large amounts of finance are likely to be involved and errors could be expensive.

Merchant banks are an obvious source of advice. They will have experience and expertise. They may also have access to clients who could help with the financing. Most of the larger firms of chartered accountants have corporate finance departments and it is likely that the auditors have a direct link to one of these. These also can offer advice.

Valuation

This is a difficult area. As with any other asset, a whole business should logically have a value based on the projected cash flows from it, discounted at a suitable rate. Estimating the cash flows will be difficult, though if Adams is keen to do a deal, help may come from its directors. Deriving a suitable discount rate will also be tricky. Looking at a listed company, whose cost of capital is more easy to estimate, might be helpful as a basis for comparison, using CAPM. The value of Adams to Greenfings is the value of the combined operation, taking account of synergistic benefits, less the value of Greenfings without Adams.

On a practical note, Adams' shareholders would be unlikely to accept less than the breakup value of their company. Greenfings would be unwilling to pay more than the cost of setting up a similar operation from scratch, bearing in mind that this would leave Adams as a competitor.

This is an area where the advisers may be able to help. Negotiations between the two sets of directors are likely to be involved before a price will be agreed.

Payment

Typically, takeovers are achieved by shares, loan stocks or cash, or some combination of these. The payment method used must be acceptable to Adams' shareholders. This is a crucial point.

Issuing shares or loan stocks will have some financial gearing implications for Greenfings.

Shares have the advantage to the shareholders of Adams that they continue to hold an equity interest, as they do at the moment. On the other hand, they may well prefer to have cash if the objective is retirement. Moreover, Adams' shareholders would probably not be too happy to have shares in an unlisted company: an asset difficult to realise. Returns could possibly be relatively high, but risky.

Having 'outsider' shareholders may not appeal to Greenfings' shareholders. On the other hand, they may see Adams' shareholders as having some expertise to be usefully kept in touch.

To Greenfings shares represent a relatively expensive form of financing in terms of servicing costs, but it is low risk from the Greenfings' point of view as there is no obligation to pay a dividend. A share issue to the shareholders of Adams would have a very low issue cost.

A loan stock issue to Adams' shareholders might be acceptable to them, but they have been equity holders and may prefer an equity investment. On the other hand, they may be pleased to have a 'guaranteed' annual return with good security. As with shares, however, disposal of loan stock could be a problem. A loan stock with a contractual redemption date might be an acceptable possibility.

From Greenfings' point of view some capital gearing might be welcome. The company seems to be lowly geared at present.

A cash payment to the directors of Adams would be likely to incur capital gains tax, as it would represent a disposal and could crystallise a liability.

Were cash to be the consideration – and this looks to be the most likely to be acceptable to Adams' shareholders – this would have to be found. The quote in the question implies that Greenfings does not have the necessary amount of cash immediately available.

Cash

The most obvious source of cash would be a rights issue to existing Greenfings' shareholders. This would probably be the ideal solution. It would retain control with the existing shareholders and not increase the financial risk. However, it might be difficult to achieve. The shareholders may not be willing to inject more of their personal funds, or they may not have the funds or the ability to raise them.

Venture capital may be a possibility here. We tend to see venture capitalists as providers of funds to fast organic growth companies that will obtain some public market listing in the foreseeable future. Greenfings may well not fit that description. Exit routes will be a major factor for any provider of equity, particularly an 'outsider'.

A loan stock issue or, more likely, a bank loan would be distinct possibilities, depending on the sort of security on offer and Greenfings' existing level of financial gearing. Given that Adams owns the freeholds on most of its sites, this is likely to mean that the value of these is a relatively high proportion of the agreed value of Adams' business.

From Greenfings' point of view, loan financing tends to be cheap, partly because of tax relief on interest payments, but it imposes a fixed cash flow obligation both for the interest and redemption.

Issue costs for a rights issue or a loan would be relatively low.

The adviser would probably be able to help with raising the necessary cash.

Takeover?

There is not too much difference to Greenfings whether it buys all of the Adams' shares (a takeover) or buys all of the assets from Adams. It may wish to use the 'Adams' name. It may wish to keep the Adams' part of the business with separate limited liability. In either of these cases, buying the shares may be better. One advantage of acquiring the assets is that Greenfings would be in no danger of acquiring unexpected liabilities of the company.

To the shareholders of Adams, there might be a preference for a takeover. This relieves them of the task of liquidating the company, though this is not a difficult or expensive task in the circumstances. On the other hand, they may wish to retain the company shell for some other venture.

Intermediary

It might be helpful to have someone act as a go-between to supervise the negotiations. This is a role that the adviser might perform.

Other issues

Other questions that could usefully be addressed are as follows.

- Has Greenfings sufficient management expertise to enable it to manage the larger enterprise?
- Will the economies of scale extend to the larger enterprise?
- Is it a good idea for an unlisted company to seek to expand without diversifying?

15 MYLOSON LTD

(a) (i) MYLOSON LTD INCOME STATEMENTS

	Actual		Forecast	
	20X2	20X3	20X4	20X5
	CU'000	CU'000	CU'000	CU'000
Revenue (increase 20% pa)	3,744	4,493	5,391	6,470
Cost of sales (increase 20% pa)	(2,280)	(2,736)	(3,283)	(3,940)
Gross profit	1,464	1,757	2,108	2,530
Operating expenses (increase 10% pa)	(780)	(858)	(944)	(1,038)
Depreciation (over 10 years)		(120)	(120)	(120)
Profit from operations	684	779	1,044	1,372
Interest (assumed constant)	(72)	(72)	(72)	(72)
Profit before tax	612	707	972	1,300
Taxation (see Working 1)	(200)	(128)	(192)	(268)
Net profit	412	579	780	1,032
Dividend (20% growth pa)	(163)	(196)	(235)	(282)
Retained profit	249	383	545	750
Reserves b/f	550	799	1,182	1,727
Reserves c/f	799	1,182	1,727	2,477
Share capital	1,200	1,200	1,200	1,200
Year end reserves	799	1,182	1,727	2,477
Year end shareholders' funds	1,999	2,382	2,927	3,677
Pre-tax return on shareholders funds	31%	30%	33%	35%

WORKINGS

(1) **Tax payable**

	Actual		Forecast	

	20X2	20X3	20X4	20X5
	CU'000	CU'000	CU'000	CU'000
Profit before tax	612	707	972	1,300
Add back depreciation	0	120	120	120
Less capital allowance (18% red./bal)	(0)	(216)	(177)	(145)
Taxable profit	612	611	915	1,275
Tax at 21% (actual for 20X2)	200	128	192	268

(2) Changes in net current assets

Receivables *	460	552	662	795
Receivables/Sales	12.3%			
Trade Payables * *	324	389	467	560
Trade Payables/Cost of sales	14.2%			

* receivables can be computed as a 20% increase each year or as 12.3% of sales

* * trade payables can be computed as a 20% increase each year or as 14.2% of cost of sales

(3) Changes in net current assets

	Actual	Forecast		
	20X2	20X3	20X4	20X5
	CU'000	CU'000	CU'000	CU'000
Inventory (unchanged)	782	782	782	782
Receivables (12.3% of sales)	460	552	662	795
Trade payables (14.2% of cost of sales)	(324)	(389)	(467)	(560)
Dividends payable	(163)	(196)	(235)	(282)
Net current assets	755	749	742	735
Increase/(decrease) in net current assets		(6)	(7)	(7)

(ii) CASH FLOW FORECASTS

	20X3	20X4	20X5
	CU'000	CU'000	CU'000
Retained profit for the year	383	545	750
Add back depreciation	120	120	120
(Investment in working capital)/release of working capital (see Working 3)	6	7	7
Expenditure on non-current assets	(1,200)		
Surplus/(deficit) for the year	(691)	672	877
Cash/(deficit) b/f	164	(527)	145
Cash/(deficit) c/f	(527)	145	1,022

Reconciliation

	Cash receipts and payments		
	20X3	20X4	20X5
Receipts	CU'000	CU'000	CU'000
Cash from sales (sales + opening receivables – closing receivables)	4,401	5,281	6,337
Payments			
For purchases (cost of sales + opening payables – closing payables)	(2,671)	(3,205)	(3,847)
Operating expenses	(858)	(944)	(1,038)
Machinery	(1,200)		
Interest	(72)	(72)	(72)
Tax	(128)	(192)	(268)
Dividends (previous year)	(163)	(196)	(235)

	(5,092)	(4,609)	(5,460)
Net cash flow	(691)	672	877
Cash/(deficit) b/f	164	(527)	145
Cash/(deficit) c/f	(527)	145	1,022

The company has a predicted shortfall at the end of 20X3 of CU527,000.

(b) To: The directors of Myloson Ltd
From: RT Consultants Date: 2 May 20X3

Report on the financial forecasts of Myloson Ltd

As requested by the terms of reference, I have prepared forecast income statements and cash flow forecasts for the years 20X3 to 20X5.

(i) **Key aspects of the financial information and the likelihood of achieving the objectives**

While the company is making good profits, the calculations show that the return on shareholders' funds will be maintained at over 30%.

The effect of the additional borrowing requirement in 20X3 will be to increase **gearing**. An analysis of the impact of using debt finance has not been carried out here. However, it is possible to say that although interest cover (operating profit/interest) is safe in 20X2 at 10.5 times (684/72), this figure will fall if borrowing the capital required.

In summary, the projections show that the company is profitable, with a good growth rate predicted but a financial strategy needs to be developed.

(ii) **Additional methods of financial forecasting**

The forecasts prepared for this report are prepared on the basis of the assumptions. These appear rather simplified. For example, the relationships between sales, costs, receivables and payables remain the same over the period, no additional inventory holdings have been budgeted for and interest on additional borrowings has been omitted.

A more detailed set of forecasts needs to be prepared, on a month-by-month basis, within the context of the company's strategic plans. A computerised planning model would be appropriate for assembling this information. Input to the forecasts will include:

- Marketing, production and purchasing plans; estimates from line managers of sales, costs, inventory and so on
- Statistical analysis of the relationship between the variables in the model and a cross-check against the managers' detailed estimates
- Estimates of general economic factors and their likely effect on the company and the industry as a whole
- Estimates of any likely changes in the behaviour and attitudes of competitors, customers and suppliers
- The results of capital investment appraisal and other decisions.

There are many ways of handling **risk** and **uncertainty** in the estimates. Suitable techniques need to be chosen from:

- The preparation of best and worst case estimates;
- Use of data tables to show ranges of possible results;
- Sensitivity analysis and the identification of 'key' variables;
- Assignment of probabilities to estimates;
- Use of simulation for complex repetitive uncertain events;
- Scenario planning and the development of contingency plans.

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(a) (i) **Forecast income statement for the year ending 30 April 20X6**

	Shares	Loan stock
	CU'000	CU'000

Operating profit (5.5m + 8% × 15m)	6,700	6,700
Interest	1,000	1,900
Profit before tax	5,700	4,800
Tax (21%)	1,197	1,008
Profit after taxation	4,503	3,792
Dividend (PAT × 29.54% payout ratio)	1,330	1,120
Retained profit for the year	3,173	2,672

(ii) **Forecast earnings per share**

Share issue	– Number of shares currently in issue	4,000,000
	– New shares issued (9,000,000/3)	3,000,000
		7,000,000

$$\text{Earnings per share} = \frac{4,503,000}{7,000,000}$$

$$= \text{CU}0.643$$

Debt issue

$$\text{Earnings per share} = \frac{3,792,000}{4,000,000}$$

$$= \text{CU}0.948$$

(iii) **Projected level of gearing**

$$\text{Share issue} = \frac{12,500}{4,000 + 9,000 + 10,500 + 3,173 + 12,500}$$

$$= 31.9\%$$

$$\text{Loan stock issue} = \frac{12,500 + 9,000}{4,000 + 10,500 + 2,672 + 12,500 + 9,000}$$

$$= 55.6\%$$

(b) **Shareholder – loan holder conflicts**

(i) **Different attitudes to risk and return**

Shareholders may want MT to undertake **risky projects** with correspondingly **high expected returns**. Loan holders will want MT to undertake projects that guarantee sufficient returns to pay their interest each year, and ultimately to repay their loans.

Here shareholders may be happy with the prospect of high returns eventually, but loan holders may be more doubtful that the **increased operating profits** from the new products will cover the extra interest burden. If extra debt is issued, interest cover will fall from 5.5 in 20X5 to 3.5 in 20X6, and loan holders will be aware that the directors are planning even more speculative investments in future.

(ii) **Dividends**

Large (albeit) legal dividends may be preferred by shareholders, but may concern loan holders, because the payments leave low cash balances in MT and hence **put at risk MT's ability** to meet its commitments to the loan holders.

Here although the directors have sought to maintain dividend levels at a constant payout ratio, they may come under pressure from shareholders to maintain dividends at a minimum level.

(iii) **Attitudes to further finance**

In this situation, shareholders may prefer MT to **raise additional finance** by means of loans, in order to **avoid having to contribute themselves** in a rights issue, or the risk of dilution of their shareholding and hence power if an open stock market issue is made. Loan holders may **not wish MT** to take on the burden of additional debt finance, because it may increase the risk that the **interest** that they are **due** will not be paid, or MT will have problems repaying their loans, particularly if the new loans rank above theirs.

(iv) **Lack of conflict**

The risks of gearing affect not only loan stock holders but also shareholders. As gearing levels rise shareholders also perceive an increase in the risk that they face in terms of the company being profitable and liquid enough to service and repay the loan finance. Therefore in some situations both shareholders and loan stock holders may both prefer additional issues of shares rather than loans.

Impact of loan holders

(i) **Restrictions imposed by bondholders**

Loan holders can enforce any restrictions in their loan agreements such as charges preventing MT from selling assets or taking out new loans. These may limit MT's ability to make profitable investments and thus maximise returns for shareholders.

(ii) **Renegotiation of debt**

Ultimately current loans will have to be repaid. If MT has stretched previous loan agreements, either the current loan holders will be able to impose **new and more onerous terms**, or the directors will have to seek loan finance from other lenders who will impose their own terms. It may become more difficult for MT to raise sufficient funds for investment on acceptable terms or at an acceptable cost of capital.

(iii) **Liquidation**

If MT defaults, the loan holders can enforce any security they have, which may **undermine MT's ability to continue trading**. Ultimately, they can take action to force MT into liquidation, although this may jeopardise their chances of receiving full repayment.

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Year	1	2	3	4	5+
	CUm	CUm	CUm	CUm	CUm
Sales (W)	605.0	653.4	686.1	706.7	
Operating profit	60.5	78.4	82.3	84.8	
Tax	(12.7)	(16.5)	(17.3)	(17.8)	
Operating cash flow	47.8	61.9	65.0	67.0	
Incr. non-current asset expense (W)	8.7	(1.9)	(0.7)	(0.4)	
Incr. working capital investment (W)	(2.2)	(1.5)	(0.7)	(0.4)	
Free cash flow	54.3	58.5	63.6	66.2	860.6
Discount factor	0.926	0.857	0.794	0.735	0.735
Present value	50.3	50.1	50.5	48.7	632.5

Total present value = CU832.1m

Value of equity = CU832.1m – CU225m = CU607.1m

Value per share = CU607.1m/50m = CU12.14

WORKING

Year	0	1	2	3	4
	CUm	CUm	CUm	CUm	CUm
Sales (increasing at given rates)	550.0	605.0	653.4	686.1	706.7
Sales increase		55.0	48.4	32.7	20.6
Incr. non-current asset expense		3.3	1.9	0.7	0.4
Non-current asset sale in year 1		(12.0)			
Total		(8.7)	1.9	0.7	0.4
Incr. working capital investment		2.2	1.5	0.7	0.4

CHAPTER 9

Managing financial risk: interest rate and other risks

Introduction

Examination context

Topic List

Introduction

Learning objectives

Tick off

- To identify and describe the key financial risks facing a business ☐
- To show and explain how financial instruments can be used to manage those risks ☐
- To describe the characteristics of financial instruments used for hedging ☐

Syllabus references relating to this chapter are 2a, b, c, e.

Syllabus links

This topic complements the foreign exchange hedging in the next chapter. These hedging techniques will be further developed and applied at advanced level.

Examination context

In the exam you are likely to be asked to explain how derivatives provide a hedge against risks, and you may have to illustrate this with non-complex calculations.

1 Introduction to derivatives

Section overview

- A derivative is a financial instrument whose value derives from something else eg an option on a share.
- A futures contract is a standardised contract to buy or sell a specific amount of a notional underlying commodity on a certain date.
- Futures give a fixed price whereas options provide a maximum or a minimum price.
- Futures and options can be used for hedging or for speculation.

1.1 Exploring risk

Risk and the impact it has on investment appraisal was explored in Chapter 3. In this chapter and the next we explore what can be done about protecting investors.

Where does it come from?	The risk facing any business comes from a variety of factors eg customer demand, rivals' actions, economic environment, social and demographic conditions, technological change, cost structures etc. Many of these influences are explored in more depth in Business Strategy. Some of the risk facing a business derives from price changes eg interest rates, exchange rates and for commodities.
Impact on investors	Many of the above influences will cause profits to alter, and therefore share prices to change, resulting in risks ultimately being borne by investors.

The purpose of hedging is to remove or reduce price risk. A range of hedging devices exists to address risks – this chapter will explore price risks associated with shares, commodities and interest rates.

The next chapter looks at currency risk.

Definition

Derivative: is a financial security whose value is derived from the value and characteristics of an underlying security. Option contracts, futures and swaps are types of derivative.

2 Forwards and futures

Section overview

- Forward contracts allow a price to be set in advance.
- Futures hedges provide a fixed price.
- Futures are available on commodities, shares, currencies and interest rates.
- Futures are standardised contracts.

To help introduce the area of hedging risk, and before we move onto derivatives themselves, consider a simple instrument known as a forward contract.

2.1 Forwards

Definition

A **forward contract** is a binding agreement to exchange a set amount of goods at a set future date at a price agreed today.

Forward contracts allow businesses to set the price of a commodity well in advance. They are particularly suitable in commodity markets such as gold, oil and agriculture where prices can be highly volatile.

Worked example: Commodity forward contract

A manufacturer of chocolate needs to purchase cocoa beans for future production and wants to acquire them for a fixed price.

The manufacturers can achieve this by agreeing with the producer of cocoa beans to purchase a quantity for delivery at a specific date in the future at a price agreed now.

In January, when the price of a consignment of cocoa beans is CU1,000, the chocolate manufacturer agrees a price with the supplier of CU1,100 for delivery at the end of March.

The price for both parties is now set – and thus whilst the market price in March may be higher or lower than the agreed price of CU1,100, the benefit for both parties is that they have certainty, and so are better able to plan and budget effectively.

Forward contracts are tailor made between two parties. Whilst this is useful as a means of giving each party what they want, it does make them awkward to cancel, as the counter party needs to agree. This is one of the reasons why a futures contract might be used – see section 2.2 below. Nevertheless, forward markets for some commodities flourish, particularly foreign exchange. This is explored in Chapter 10.

2.2 Futures

Whilst these are very similar to forward contracts and ultimately achieve the same end from a hedging perspective, ie a fixed price, there are some significant differences.

A future represents a **commitment** to an **additional transaction** in the future that limits the risk of existing commitments.

Definition

Future: is a **standardised contract** to **buy** or **sell** a **specific amount** of a commodity, currency or financial instrument at a **particular price** on a **stipulated future date**.

Worked example: Commodity futures

1 January

(a) On 1 January the price (the spot price) of a consignment of cocoa beans is CU1,000 in the cocoa market.

(b) You want to buy a consignment of cocoa beans on 31 March on this cocoa market, but the price is uncertain.

(c) You buy separately on a futures market a three-month cocoa futures contract at CU1,100 that expires on 31 March. This means you are committing to buying a consignment of cocoa beans, not at today's spot price, but at the futures price of CU1,100, which represents what the futures market thinks the spot price will be on 31 March.

31 March

(a) You buy the consignment of cocoa beans on 31 March from the cocoa market, while the spot price on that date is CU1,200.

(b) Under the futures contract you are still committed to buying the consignment at CU1,100 on 31 March, but that will mean that you have two consignments of cocoa beans rather than just the one you need. You therefore sell on 31 March the futures contract you bought on 1 January to eliminate this additional commitment.

Assuming that the futures contract at 31st March is now priced at CU1,200 (as this is the same as the spot price on 31 March), you will sell the futures contract for CU1,200.

(c) Because you have sold the contract for more than the purchase price, you have made a gain on the futures contract of CU1,200 – CU1,100 = CU100. This can be set against the purchase you made in the cocoa market.

Net cost = CU1,200 – CU100 = CU1,100

ie supplies have been obtained at a fixed price, being the futures price.

A summary of the transactions is as follows:

Prices on the cocoa market		Prices on the futures market	
1 January: prevailing price (the spot price)	CU1,000	Price for buying cocoa for March delivery	CU1,100
31 March: prevailing price (the spot price)	CU1,200	Price for selling cocoa for March delivery	CU1,200
Increase in cost of cocoa in cocoa market	CU200	Gain from trading futures contracts	CU100

As noted above, the increase in the cost of cocoa has been hedged by the trading carried out on the futures market.

These are two separate markets – the cocoa market is involved with buying and selling physical consignments of cocoa. The futures market is not. Notice that on the futures market no physical delivery has taken place. Rather, the opening contract to buy in March has been cancelled by an opposing contract to sell in March.

The net effect of these is:

- Buy the cocoa in the cocoa market for CU1,200
- Take the gain on the futures market CU100
- Overall cost of the cocoa CU1,100

2.3 The development of futures contracts

Futures are derivatives which have their origins in the markets for commodities such as wheat, coffee, sugar, meat, oil, base metals and precious metals.

- The prices of all of these commodities **fluctuate seasonally** and are also subject to large changes because of unpredictable events such as storms, drought, wars and political unrest.

- To avoid the uncertainty arising from large swings in prices, buyers and sellers of these commodities would **agree quantities** and **prices in advance** ie a forward contract. This encourages investment in production and benefits buyers and sellers alike by enabling them to plan in advance.

Originally the buyer and seller would agree a *forward* price for settlement by *actual* delivery of an agreed amount of the commodity on an agreed date. As a protection against defaulting on the deal, both parties would put down a deposit.

However, the commodity futures markets developed rapidly when the contracts were **standardised** in terms of **delivery date** and **quantity**. This enabled the futures contracts to be traded purely on the basis of price, like shares on a stock exchange and thus separates the futures market from the physical commodity market. The London International Financial Futures and Options Exchange (LIFFE) was set up in 1982, and in 2000 became part of Euronext to form Euronext.Liffe.

Traditionally, derivatives have been used to hedge market price risk. For example, currencies, interest rates, commodity, and share prices all change. Those changes can be hedged against by using the various hedges outlined above.

2.4 Index futures

These can be used to protect against falls in the value of a portfolio of shares, thus are of real importance to companies with significant investments, such as pension funds.

Traded futures are available based on the FTSE 100 share index. The **transaction costs** of investing in these futures are much less than the costs of actually selling and buying shares. Use of futures is an alternative to adjusting the share portfolio, which may not be appealing.

Each **contract** is for a notional value of the futures price multiplied by CU10. Thus, if the FTSE index futures price stands at 4,500, the notional value of a contract is CU45,000.

Index futures can be useful to an investor in a number of ways, either for **speculative purposes** or as a **'hedge'** against risk of adverse movements in market prices generally.

Worked example: Using index futures to set up a portfolio hedge

The investment manager of Moonstar Pensions Fund is concerned that share prices will fall over the next month and wishes to hedge against this using FTSE stock index futures. The fund's pension portfolio comprises investments which have a market value of CU5 million on 1 June 20X3.

On 1 June 20X3 the following prices are observed:

The prevailing value (ie spot value) of the FTSE 100 index is 5,000

The quote for September FTSE 100 index futures is 4,980

The face value of a FTSE 100 index contract is CU10 per index point.

Using the futures price of the FTSE 100 index, this gives a contract value of 4,980 × CU10 = CU49,800

Requirement

Demonstrate what hedge should be undertaken to protect the portfolio against falls in share prices.

Solution

Calculate number of contracts

We should *sell* futures to protect our portfolio.

$$\text{Number of contracts} = \frac{\text{Market value of portfolio}}{\text{Value of one contract}}$$

$$= \frac{\text{CU}5{,}000{,}000}{\text{CU}49{,}800}$$

= 100.4 rounded to 100 contracts

We can assess the results of the hedge by examining the situation at a later date.

Worked example: How index futures provide a hedge if the market falls

On 30 June 20X3, the market value of the shares in the portfolio was CU4.8 million.

The FTSE 100 index and the futures index both stood at 4,800 on that date.

Requirement

Calculate the outcome of the hedge that Moonstar has undertaken.

Solution

Step 1

Position in spot market

Loss on portfolio = CU4.8 million – CU5 million
= CU0.2 million

Step 2

Calculate gain or loss on futures

Buy futures at lower price than we sold them for (closing out)

Gain on futures = (4,980 – 4,800) × CU10 × 100 contracts
= CU180,000

Step 3

Calculate net position

Net position = CU180,000 gain on futures – CU200,000 loss on portfolio
= CU(20,000) loss overall

Note: the hedge is less than 100% efficient because of basis (ie the 1 June FTSE index value and the futures price are different) and the rounding of the number of contracts. See section 2.6 below.

Worked example: The impact of hedging if the market rises

On 30 June 20X3, the market value of the shares in the portfolio was CU5.1 million.

The FTSE 100 index and the futures index both stood at 5,100 on that date.

Requirement

Explain what happens as a consequence of the hedge.

Solution

Step 1

Position in spot market

Gain on portfolio = CU5.1 million – CU5 million = CU0.1 million

Step 2

Calculate gain or loss on futures

Initially sold futures for	4,980
Now buy futures for	5,100
Loss on closing out futures	(120) × CU10 × 100 contracts = CU120,000

Step 3

Calculate net position

Net position	CU100,000	gain on portfolio
	(120,000)	loss on futures
	CU(20,000)	loss overall

2.5 The impact of a future hedge

The objective of a futures hedge is to remove risk which is achieved by fixing the price. The benefit is that downside risk is eliminated, the disadvantage is that any upside is also removed.

To summarise the above worked examples:

	If market rises	If market falls
Value of portfolio	5,100,000	4,800,000
Gain (loss) on futures market	(120,000)	180,000
Net effect	CU4,980,000	CU4,980,000

In each situation, the value of the portfolio stays the same.

The hedge is not 100% efficient, as noted below.

2.6 The main elements of futures transactions

• **The contract size**	The **contract size** is the fixed quantity which can be bought or sold using a futures contract. In general, dealing on futures markets must be in a whole number of contracts. The implication of this is that the amount of an exposure and the amount covered by a futures hedge may not match exactly.
• **The contract price**	The **contract price** is the price at which the futures contract can be bought or sold. The contract price is the figure which is traded on the futures exchange on the date the company **originally purchases** the futures contract. It changes continuously and is the means for computing gains or losses.
• **The settlement date**	The **settlement date** (or delivery date, or expiry date) is the date when trading on a particular futures contract stops and all accounts are settled. For example, the settlement dates for all currency futures are at the end of March, June, September and December.
• **The initial margin**	When futures contracts are bought or sold, a **deposit** known as the **initial margin** must be advanced. The size of this margin depends on the actual contract but might typically amount to about 5% of the value of contracts dealt in. This deposit is refunded when the contract is closed out. The objective of the initial margin is to cover any possible losses made from the first day's trading. Thereafter, any variations in the contract price are covered by a **variation** margin. Profits are advanced to the trader's account but losses must be covered by advancing further collateral. This process is known as **marking to market**.
• **Basis**	The price of a futures contract may be different from the spot price on a given date, and this difference is the **basis**. The exception is on the expiry date, when the basis is zero. **Basis** = spot price – futures price The effect of basis is to **prevent** hedges from being 100% efficient ie the change in the spot **over a period** is not matched exactly by the change in the futures price. You will not be asked to calculate basis in the examination, but just to recognise that it causes hedges to be less than 100% efficient.
• **Hedge efficiency**	The only risk to hedgers is that the futures market does not always provide a perfect hedge. (a) The first reason is that the value of the commodity being hedged (whether it is shares, currency or interest) must be **rounded to a whole number of contracts**, causing inaccuracies. (b) The second reason is **basis risk** as noted above. A measure of **hedge efficiency** compares the profit made on the futures market with the loss made on the cash or commodity market, or *vice versa*.

3 Options

Section overview

- An option gives the right, not the obligation, to trade.
- Options can be exchange traded options or an over the counter (OTC) option.
- Traded options are standardised.
- Options have an intrinsic value and a time value.

3.1 The nature of an option

Definition

An **option** is an agreement giving the buyer of the option the **right, but not the obligation,** to buy or to sell a specific quantity of something (eg shares in a company, a foreign currency or a commodity) at a known or determinable price within a stated period.

Options offer a choice between

- **Exercising** your right to buy or sell at a pre-determined price (known as the **exercise price**, or **strike price**), and
- Not exercising this right: allowing the option to lapse, sometimes known as **abandoning** the option – an option which is not used is either discarded or, possibly, sold to somebody else who might find it valuable, if the rules allow this

It is this element of **choice** which is the **distinction between options and futures**.

Worked example: Share options

What is the effect on an investor owning an option which gives the right to buy a share in company X for CU2.00?

Current share price of company X is CU2.00

Consider the impact of the share price of company X

(a) Rising to CU2.50

(b) Falling to CU1.70

Solution

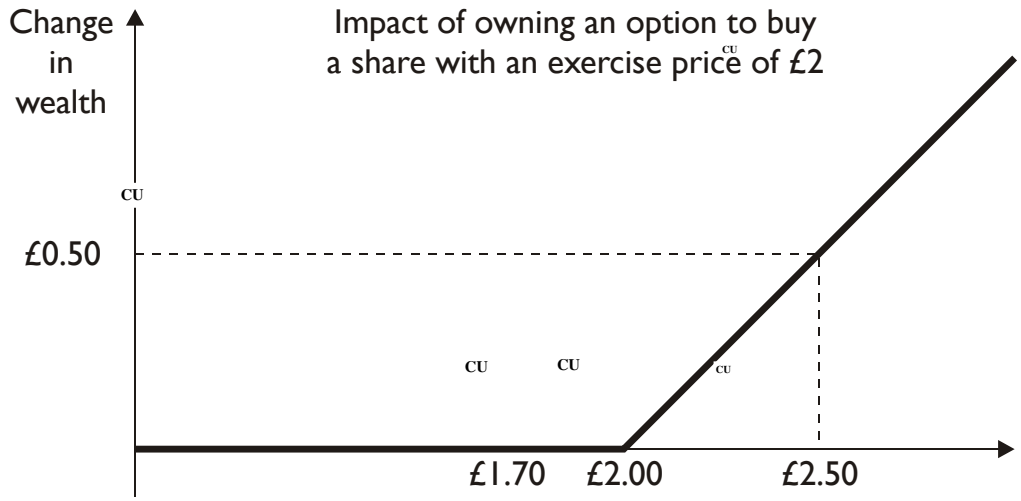
Currently, the option has no intrinsic value, as exercising the option means:

	CU
Cost of Co X share using the option	(2)
Selling price of Co X share =	2
	0

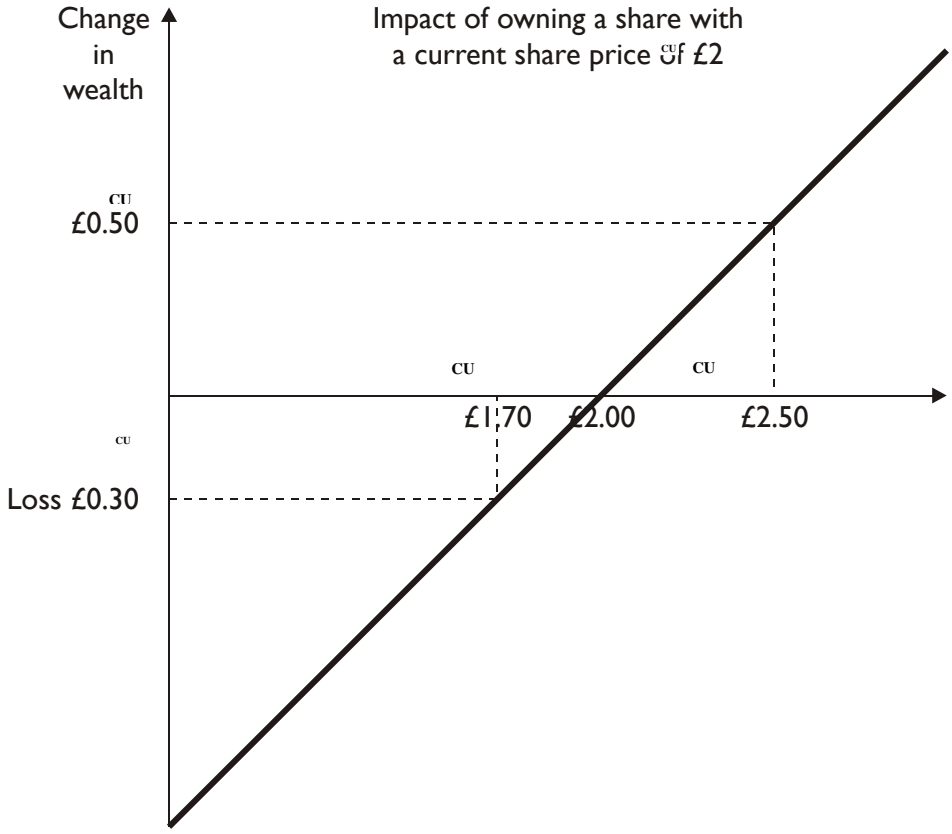
If the share price changes

	Company X Share price rises	Company X Share price falls
	CU	CU
Can sell the share for the prevailing price	2.50	1.70
Cost of company X share via option to buy	2.00	2.00
Exercise therefore gains	0.50	Abandon

In summary, holding an option gives upside but removes downside.



Note: If the share itself had been owned, a drop in the share price to CU1.70 would have resulted in a loss of CU0.30.



3.2 Options terminology

The following paragraphs use share options to illustrate the different types of options and the terminology involved.

Over the counter options	A company or an investor can arrange a tailor-made option for their specific needs with a financial institution, and this is called an **over-the-counter** (OTC) option. OTC share options may be for any number of shares or other stocks.

Puts and calls	• A **call option** means an investor is entitled to **buy** the shares at the exercise price within the specified period • A **put option** means an investor has the right to **sell** the shares at the exercise price within the specified period The price written into the option is called the **exercise price** or **strike price**.
Relationship between strike price and spot price	• An option is said to be **in the money** when, if it is exercised today, a profit would be made • An option is said to be **out of the money** when, if it were exercised today, a loss would be made (consequently it would not be exercised today) • An option is said to be **at the money** if the exercise price equals the underlying security price

3.3 Example of options

3.3.1 Share options

These can be issued by a company as a way of rewarding employees. The feature of **share options** is that they give the **right to apply for shares** at a date in the future, at a specified price that will probably be favourable to the applicant.

For example, a public company whose shares are currently traded at CU2 on the stock market might award share options to some of its employees, giving them the right to apply for a quantity of shares at a date in the future at a price of, say, CU2. Provided that the market price of the shares rises above CU2 by the time the options can be exercised, the employees would then be able:

- To obtain some shares, and so get an equity interest in their company, or
- To obtain some shares and then sell them at a profit – the share options would then give, in effect, a cash bonus

3.3.2 Pure options

These are options to buy or sell assets that *already exist.*

For example, if a pure option to buy a company's shares is exercised then the company does not issue new shares, but rather the seller of the option must buy shares in the company on the stock market at the prevailing price and sell them to the option holder.

Similarly a **currency option** is an option to **buy or sell currency** which already exists. No new currency is issued by the government.

3.4 Option writers and option purchasers

A pure option is created by an **option writer**. This will typically be a large financial organisation such as an investment bank.

Worked example: Writing a call option

Suppose that the writer drafts an option contract and gives it to another party (whom we will call the **holder**) which allows the holder to buy one hundred shares in Fonex Ltd (a fictional company) at 400 pence each on 30 June. The company's share price is at the moment 390 pence. Consider the holder's position if the share price on 30 June:

(a) Rises to 450 pence

(b) Falls to 330 pence.

Solution

(a) The option holder exercises the right to buy 100 shares at 400p each and immediately sells them on the market for 450 pence each, making a total gain of CU50. Where does the holder buy the shares at 400p? No new shares are issued, so the option holder must buy them from the option writer. If the option writer does not own Fonex shares, he must buy them on the market for 450p and sell them to the option holder for 400p, making a loss of 50p × 100 = CU50. So in situation (a), the option holder makes a profit out of the option writer.

Alternatively, we could say the writer has lost 50p.

(b) The holder does not exercise the option, but allows it to lapse. Both the holder and the writer have made no gain and no loss.

The option holder will clearly be very happy with this option agreement. If Fonex shares rise she makes a gain, but if they fall she makes no loss. The writer, however, is in a no-win situation. If the shares rise, he loses, and if they fall he makes no gain.

3.5 Premium

So why would anybody want to write options?

The answer is because the writer does not give the options away but **sells** them.

In order to **acquire an option**, then, you have to **purchase** it. Note that this is different from a future. You have to **purchase** an **option** because it gives you a **powerful choice**, which you can use to limit your risk. The **option writer** accepts the **risk** which the purchaser avoids. The writer therefore needs to be paid in **compensation**.

The **cost** of an option to a purchaser is known as the option **premium** – the same term as the price of an insurance policy.

Interactive question 1: Impact of a put option [Difficulty level: Intermediate]

Illustrate the effect on an investor of purchasing a put option on a share in company X, given the following:

	CU
Current share price	1.70
Exercise price	2.00
Premium	0.10

(a) If the share price rises to CU2.00
(b) If the share price rises to CU2.50

Show diagrammatically the outcomes from

(i) Holding the share
(ii) Buying the put
(iii) Holding the share and buying the put.

See **Answer** at the end of this chapter.

3.6 Traded options

One of the disadvantages of OTC options is that because they are all different, there is no ready market for them. This problem is overcome by **traded options**, these are standardised and are traded on Euronext.Liffe and similar exchanges.

An **American-style option** is an option that can be exercised on any day until the expiry date.

A **European-style option** is one which can only be exercised on the expiry date. This terminology is however potentially misleading, since most options traded in Bangladesh and Europe are in fact American options.

There are two parties to each traded option contract:

- The person who receives the option premium in exchange for granting an option, known as the seller or writer, as noted above in section 3.4
- The person who buys the option

Worked example: Prices of traded options

Prices of traded share options are quoted in tables, such as the following for options on shares in Reuters.

Reuters – underlying security price 679 (7 May) **(1)**

		Calls ***(2)***				*Puts* ***(3)***		
Exercise price		*Jul*	*Oct*	*Jan*		*Jul*	*Oct*	*Jan*
(4)	650	52	67	84		14½	24	31½
	700	25	41	58	**(5)**	37½	44½	55

This table shows the following.

(1) Reuters shares are trading at 679 pence on 7 May.

(2) **Call** or **buy** options are available with expiry dates at the end of July, October and January.

(3) **Put** or **sell** options are also available with expiry dates at the end of July, October and January.

(4) Two possible **exercise prices** exist, one below the current share price (650p) and one above the current share price (700p).

(5) The figures in the table show the **price** (premium) per share of each option contract in pence.

   (a) A **call option** is in the money if the **exercise price** is **below** the underlying security price. All the 650 call options are in the money, and all the 700 call options are out of the money.

   (b) A **put option** is in the money if the exercise price is **above** the underlying security price. All the 700 put options are in the money, and all of the 650 put options are out of the money.

If the Reuters share price were to rise to 700p, all the 700 options would be at the money.

For all traded options there will be at least one **exercise price** above the current share price and another below it. If the Reuters share price were to rise above 700p (for at least three days) a new series of options with exercise price 750p would be created.

3.7 Intrinsic value and time premium

The **intrinsic value** of an option is computed by assuming that its **expiry date is today**.

'In the money' options would be **exercised** and have an **intrinsic value** equal to the **difference** between the **exercise price** and the **current share price**.

'Out of the money' options would not be exercised and would therefore have **zero intrinsic value**.

The intrinsic value of calls and puts can be summarised in the following formulae.

(a) The intrinsic value of a call option is the higher of (i) share price minus exercise price; and (ii) zero.
(b) The intrinsic value of a put option is the higher of (i) exercise price minus share price; and (ii) zero.

ie intrinsic value depends on the exercise price and the current share price with a minimum value of zero (it can never be negative).

Worked example: Intrinsic values

Intrinsic values of the Reuters options as at 7 May in a particular year are shown in the table below.

Intrinsic values – Reuters share options (underlying share price = 679)

	Calls			Puts		
Exercise price	Jul	Oct	Jan	Jul	Oct	Jan
650	29	29	29	0	0	0
700	0	0	0	21	21	21

3.8 Time premiums

By comparing with the original table, we can see that in all cases the **actual option prices** are higher than the intrinsic value. This is because options also have a **time value** or **time premium**.

In the period between today (in this example, 7 May) and the expiry date of the options there is a chance that the share price might rise, giving greater gains for call options, or it might fall, benefiting put options.

The time value can be computed for each option as the difference between the option's **actual value** and its **intrinsic value**.

Worked example: Time values

Time values – Reuters share options (underlying share price = 679)

		Calls			Puts	
Exercise price	*Jul*	*Oct*	*Jan*	*Jul*	*Oct*	*Jan*
650	23	38	55	14½	24	31½
700	25	41	58	16½	23½	34

Note that the **time value** of *all* options **increases** with the **time period to expiry**. The time value actually depends on a number of factors, which include:

- The time period to expiry of the option – the longer the time to expiry, the more the option is worth
- The volatility of the underlying security price – a more volatile security price increases the likelihood of the option being in the money and therefore increases the value of the option
- The general level of interest rates (the time value of money) – the exercising of the option will be at some point in the future, and so the value of the option depends on the present value of the exercise price. Eg for a call, if interest rates rise the present value of the exercise price falls and the option is more valuable

3.9 Index options

Traded options are available on the FTSE 100 share index.

The **contract** size is for a notional value of the exercise price multiplied by CU10. Thus, if the exercise price stands at 4,500, the notional value of a contract is CU45,000 (as for futures). Exercise prices are set at intervals of 50 index points (eg 4,400, 4,450, 4,500, 4,550 etc).

Index options can be useful to an investor in a number of ways, either for **speculative purposes** or as a **'hedge'** against risk of adverse movements in market prices generally.

Worked example: Index options

The investment manager of Moonstar Pensions Fund is concerned that share prices will fall over the next month and wishes to hedge against this using June FTSE stock index options.

The fund's pension portfolio comprises investments, which have a value of CU4 million on 1 June 20X3.

On 1 June 20X3 the following options are available.

FTSE 100 INDEX OPTION (*4000) CU10 per full index point

	3900		3950		4000		4050		4100	
	C	P	C	P	C	P	C	P	C	P
June	135	30	100	44	70	66	45	95	30	130
July	210	90	180	110	150	130	120	155	100	185
August	270	130	240	150	215	175	185	195	160	220

*Underlying index value.

Requirement

Demonstrate what happens if either of the following two situations arises on 30 June.

(a) The portfolio value falls to CU3.8 million, and the FTSE index drops to 3,800.

(b) The portfolio value rises to CU4.1 million and the FTSE index rises to 4,100.

Solution

Step 1

Set up the hedge

- What sort?

  The concern is that the value of the portfolio held by the fund will fall, so an option to sell is required. Thus a June put option with an exercise price of 4,000 is purchased. (ie the 4,000 exercise price is closer to maintain the existing value of the portfolio)

- How many?

The portfolio value is	CU4 million
The exercise price of the option is	4,000
The value of one contract is 4,000 × CU10 =	CU40,000

The number of option contracts required to cover a portfolio of CU4 million is therefore CU4million/CU40,000 = 100 contracts

Step 2

What does it cost?

The premium payable for 100 June puts at 4,000 is 66 points per contract.

66 points × CU10 per point × 100 contracts = CU66,000

Step 3

Do we exercise?

	Index rises	Index falls
FTSE 100 index	4,100	3,800
Put option gives right to sell at	4,000	4,000
	Abandon	Gain 200 on exercising
Value of options	0	200 × CU10 = 2,000 × 100 contracts = CU200,000

Step 4

Overall position

	CU	CU
Value of portfolio	4,100,000	3,800,000
Gain on option		200,000
Note that the option removes the downside risk but leaves the upside potential.	4,100,000	4,000,000
Cost of the premium	(66,000)	(66,000)
	CU4,034,000	CU3,934,000

CHAPTER 9

4 Interest rate risk

Section overview

- Interest rate movements create risks for companies.
- Hedges available include forward rate agreements (FRAs), futures, options and swaps.

4.1 Introduction

Corporate treasurers will be responsible for managing the company's cash and borrowings so as to be able to repay debts as they fall due and to minimise the risks surrounding interest payments and receipts.

Where the magnitude of the risk is **immaterial** in comparison with the company's overall cash flows, one option is to **do nothing** and to accept the effects of any movement in interest rates which occur.

4.2 Risks from interest rate movements

Fixed rate versus floating rate debt	A company can get caught paying **higher interest rates** by having fixed rather than floating rate debt, or floating rather than fixed rate debt, as market interest rates change.
Term of loan	A company can be exposed by having to **repay a loan earlier** than it can afford to, resulting in a need to re-borrow, perhaps at a higher rate of interest.
Term loan or overdraft facility	A company might prefer to **pay for borrowings only when it needs the money** as with an overdraft facility. Alternatively, a term loan might be preferred, but this will cost interest even if it is not needed in full for the whole term.
Deposit at floating rates	If interest rates fall then a company would suffer a loss of interest

4.3 Reducing interest rate risk

Methods of reducing interest rate risk include:

- Pooling of assets and liabilities
- Forward rate agreements (FRAs)
- Interest rate futures
- Interest rate options (or interest rate guarantees)
- Interest rate swaps

4.4 Pooling of assets and liabilities

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

4.5 Forward Rate Agreements (FRAs)

Forward Rate Agreements allow borrowers or lenders to fix their future rate of interest. The FRA runs for a given period in the future eg from month 3 in the future to month 9.

For example, a borrower wanting to hedge their interest rate risk for a period of six months starting in three months' time would purchase a '3-9' FRA – this shows that the FRA starts in three months from now and finishes in nine months from now. If the actual interest rate proves to be higher than the rate agreed, the bank pays the company the difference. If the actual interest rate is lower than the rate agreed, the company pays the bank the difference.

The overall effect is to leave the rate paid by the borrower fixed. Thus an FRA is the equivalent of a forward contract.

4.6 Features of FRAs

FRA terminology

- 5.75-5.70 means that you can fix a borrowing rate at 5.75% and a deposit rate at 5.7%.
- A '3-6' forward rate agreement is one that starts in three months and lasts for three months ie ends in six months.
- A borrower will buy an FRA, whilst an investor will sell an FRA.

Limitations of FRAs

- They are usually only available on loans of at least CU500,000
- They are also likely to be difficult to obtain for periods of over one year. This problem can be overcome by using a swap. See section 7 below
- They remove any upside potential ie they give a fixed rate of interest

Advantages of FRAs

- For the period of the FRA at least, they **protect the borrower/investor** from adverse market interest rate movements
- FRAs can be tailored to the amount and duration required, whereas some other hedges, ie futures, are standardised

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

Worked example: Forward Rate Agreement

It is 30 June. Lynn Ltd will need a CU10 million six month fixed rate loan from 1 October. Lynn wants to hedge using an FRA. The relevant FRA rate on 30 June is 6%.

(a) State what FRA is required.

(b) Explain the result of the FRA and the effective loan rate if the six month FRA benchmark rate has moved to

(i) 5%
(ii) 9%

Solution

(a) The Forward Rate Agreement to be bought by the borrower is '3-9' (or 3v9)

(b) (i) At 5% because interest rates have fallen, Lynn Ltd will pay the bank:

	CU
FRA payment CU10 million × (5% – 6%) × 6/12	(50,000)
Payment on underlying loan 5% × CU10 million × 6/12	(250,000)
Net payment on loan	(300,000)
Effective interest rate on loan	6%

(ii) At 9% because interest rates have risen, the bank will pay Lynn Ltd

	CU
FRA receipt CU10 million × (9% – 6%) × 6/12	150,000
Payment on underlying loan at market rate 9% × CU10 million × 6/12	(450,000)
Net payment on loan	(300,000)
Effective interest rate on loan	6%

5 Interest rate futures

Section overview

- Interest rate futures are standardised FRAs.
- Interest rate futures are priced at 100 – rate of interest.
- Buying an interest rate future equates to investing in debt.
- Selling interest rate futures equates to borrowing.

5.1 Futures contracts

Interest rate futures are similar in effect to FRAs, except that the terms, amounts and periods are **standardised** as for other contracts.

As has been explained in section 2.3 above, the **standardised nature** of futures is a limitation on their use by the corporate treasurer as a means of hedging, because they **cannot always be matched** with specific interest rate exposures. However, their use is growing. Futures contracts are frequently used by banks and other financial institutions as well as large (often multinational) companies as a means of hedging their portfolios: such institutions are often not concerned with achieving an exact match with their underlying exposure.

5.2 Entitlement with contracts

With interest rate futures what we **buy** is the entitlement to **interest receipts** and what we **sell** is the promise to make **interest payments**. For example, a lender or depositor looking to hedge interest rate volatility would buy 3-month contracts. This gives the right to receive interest for three months in pounds. Similarly when a borrower sells a 3-month Taka contract he incurs an obligation to make interest payments for three months.

- **Borrowers** will wish to hedge against an interest rate rise by **selling futures now** and **buying futures** on the day that the interest rate is fixed (ie when the hedge is closed out)
- **Lenders** (depositors) will wish to hedge against the possibility of falling interest rates by **buying futures now** and **selling futures** on the date that the actual lending starts.

5.3 Other factors to consider

- All of the interest rate futures we shall encounter are for short-term interest rates.

  Short-term interest rate futures contracts (STIRs) normally represent interest receivable or payable on *notional* lending or borrowing **for a three month period** beginning on a standard future date. The contract size depends on the currency in which the lending or borrowing takes place.

  For example, 3-month sterling interest rate futures have a standard contract size of CU500,000. The price of a March contract reflects the interest rate on notional lending or borrowing of CU500,000 for three months, starting at the end of March. Only sterling interest rate futures will be examinable.
- As with all futures, a **whole number of contracts** must be dealt with. Note that the notional **period of lending or borrowing starts** when the **contract expires**, at the **end of March**.
- On LIFFE, futures contracts are available with **maturity dates** at the end of March, June, September and December.

5.4 Pricing futures contracts

The **pricing** of an interest rate futures contract is determined by the interest rate (r) and is calculated as (100 – r).

For example, if interest rates are 8%, a futures contract will be priced at 92 (100 – 8). If interest rates are 11%, the contract price will be 89 (100 – 11).

Note that the interest rate must be stated as a **percentage**, not a decimal. If, over the next week, the futures price **increases** to 92.20, this implies that interest rates at the end of March are now expected to be **lower** at 7.8% (because 100 – 7.8 = 92.20).

Worked example: Standardised interest rate futures

If an investor buys one 3-month sterling CU500,000 March contract for 93.00 what have they done?

What would happen if interest rates dropped by 2%?

Solution

The features of this futures contract can be broken down as follows:

3-month March contract	This notional investment will pay interest for three months only, from March
Sterling	The currency in which interest will be paid, and in which the notional investment is being made
CU500,000	The standard contract size. An investment of less than this is not possible, and more than this will be only possible in multiples of CU500,000
Buying a contract	Interest rate futures are notional debt securities, eg like bonds. Buying a future means investing, and thus receiving interest
Buying a future for 93.00	The price of a future =100 – r Therefore a price of 93 implies a rate of 7% These are 3-month contracts, so the 7% refers to the annual rate of interest on a 3-month deposit

(Price = 100 – r)
93 = 100 – 7%

If interest rates dropped by 2% to 5% the price would rise.

Price = 100 – 5 = 95

The investor could then close out his position by selling a March contract

Buy at	93.00
Sell at	95.00
Gain	2.00%

The interest rate used to determine the price of a future is an annual rate, whereas the contract is for three months.

In the example, the 2% refers to the change in the annual rate for 3-month deposits. As these are 3-month contracts, the gain on one contract is

2% × 3/12 × CU500,000 = CU2,500

5.5 Maturity mismatch

Maturity mismatch occurs if the actual period of lending or borrowing does not match the notional period of the futures contract (three months). The number of futures contracts used has to be adjusted accordingly. Since fixed interest is involved, the number of contracts is adjusted in proportion to the time period of the actual loan or deposit compared with three months. For example, if the period of borrowing is **six months** the number of contracts is **doubled**. This leads to the following formula.

$$\text{Number of futures contracts} = \frac{\text{Amount of actual loan or deposit}}{\text{Futures contract size}} \times \frac{\text{Length of loan}}{\text{3 months}}$$

Remember that it is the **length** of the loan that determines how many futures contracts are needed. The period between today's date and the start of the loan is **not** relevant; we are hedging over the **life** of the loan.

Interactive question 2: Maturity mismatch [Difficulty level: Intermediate]

On 5 June, a corporate treasurer decides to hedge a short-term loan of CU17 million which will be required for two months from 4 October to 3 December. Three-month sterling futures, December contract, are trading at 98.15. The contract size is CU500,000. How many contracts are required?

See **Answer** at the end of this chapter.

Worked example: Interest rate futures

The following futures price movements were observed during a week in October.

Contract	*Price at start of week*	*Price at end of week*
December sterling STIR	90.40	91.02

Hawthorn Ltd had previously sold ten December short sterling contracts (standard contract size CU500,000).

Requirement

Calculate the profit or loss to the company for the week on the sterling futures contracts.

Solution

Increase in price (91.02 – 90.40 = 0.62)	0.62%
Increase in value of one contract (0.62% × 3/12 × CU500,000) =	CU775
The company is a seller of ten contracts and would lose (CU775 × 10 contracts)	(CU7,750)

ie buying at a higher price than selling.

Interactive question 3: Interest rate hedge using futures

[Difficulty level: Intermediate]

It is 1 January, and a company has identified that it will need to borrow CU10 million on 31st March for six months.

The spot rate on 1 January is 8% and March 3 month interest rate futures with a contract size of CU500,000 are trading at 91.

Demonstrate how futures can be used to hedge against interest rate rises. Assume that at 31st March the spot rate of interest is 11% and the March interest rate futures price has fallen to 89.

Solution

(a) Set up the hedge

(b) Outcome in futures market

(c) Outcome in spot market

See **Answer** at the end of this chapter.

5.6 Hedging lending

In the language of interest rate futures, lending equals buying. The treasurer hedges against the possibility of falling interest rates by buying futures now and selling futures on the date that the actual lending starts. The calculation proceeds in a similar way to the example above.

Interactive question 4: Hedging by a lender

[Difficulty level: Intermediate]

A US company will have a surplus of CU2 million for three months starting in August. The cash will be placed on fixed interest deposit, for which the current rate of interest is 5% pa. How can the deposit income be hedged using futures contracts? The September 3-month sterling futures contract is currently trading at 94.00. It has a standard contract size of CU500,000.

Solution

See **Answer** at the end of this chapter.

6 Interest rate options

Section overview

- **Interest rate options** allow an organisation to limit its exposure to adverse interest rate movements, while allowing it to take advantage of favourable interest rate movements.
- **Borrowers** can set a **maximum** on the interest they have to pay by buying **put** options.
- **Lenders** can set a **minimum** on the interest they receive by buying **call** options.

6.1 Interest rate options (guarantees)

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

An **interest rate guarantee (IRG)** refers to an interest rate option which hedges the interest rate for a single period of up to one year.

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

6.2 Traded interest rate options

Exchange-traded interest rate options are available as **options on interest rate futures**, which give the holder the right to buy (call option) or sell (put option) one futures contract on or before the expiry of the option at a specified price. The best way to understand the pricing of interest rate options is to look at a schedule of prices.

Worked example: Traded option pricing

Futures options CU500,000

Strike price		*Calls*			*Puts*	
	Nov	*Dec*	*Jan*	*Nov*	*Dec*	*Jan*
95.00	0.87	1.27	1.34	0.29	0.69	1.06
95.50	0.58	0.99	1.10	0.50	0.91	1.32
96.00	0.36	0.76	0.88	0.77	1.18	1.60

Requirement

(a) Explain the components of the table

(b) Illustrate how a borrower would use the table to hedge against an interest rate rise.

Solution

(a) The components of the table are as follows:

(i) The **contract size** is CU500,000.

(ii) The **strike price** is the price that will be **paid for the futures contract** (if the option is exercised).

(iii) A price of 96.00 represents an interest rate of 100 – 96 = 4% p.a

(iv) The numbers under each month represent the **premium** (in % terms) that must be paid for the options.

For example, the cost of a November put option with an exercise price of 95.50 is

0.5% × CU500,000 × 3/12 = CU625

As with interest rate futures, the rates are expressed as annual interest rates, but as these are 3-month contracts, the rates have to be adjusted to reflect this.

(b) Hedging a rate increase

Consider a borrower who is concerned that interest rates may rise. A rise in interest rates from say 4% to 6% would cause interest rate futures to fall in price from 96 to 94.

The borrower would therefore want to have the right to sell a future at 96 (which equates to borrowing at 4%). In the event that interest rates increased, the option would be exercised ie future sold for 96 and then the future would be closed out at the prevailing price of 94.

If interest rates fall to say 3% futures price would rise to 97 and so the option to sell at 96 would be abandoned.

		Rate increase to 6%	Rate fall to 3%
Option to sell a future		96	96
Prevailing price of future		(94)	(97)
Effect	exercise and gain	2 %	abandon

Thus the option will remove the downside to a borrower if interest rates rise, but leave the upside if interest rates fall.

6.3 Using traded interest rate options for hedging

To use traded interest rate options for hedging, note the following specific points:

(a) If a company needs to **hedge borrowing** at some future date, it should **purchase put options**. Instead of selling futures now and buying futures later, it **purchases** an option to **sell futures** and only exercises the option if interest rates have risen causing a fall in the price of the futures contract. This is known as a cap.

(b) Similarly, if a company needs to **lend money**, it should **purchase call options** (an option to buy futures).

Worked example: Traded options

Panda Ltd wishes to borrow CU4 million fixed rate in June for nine months and wishes to protect itself against rates rising above 6.75%. It is 11 May and the spot rate is currently 6%. The data is as follows:

SHORT STERLING OPTIONS (STIR)

CU500,000

Strike price		*Calls*			*Puts*	
	June	*Sept*	*Dec*	*June*	*Sept*	*Dec*
93.25	0.16	0.19	0.21	0.14	0.92	1.62
93.50	0.05	0.06	0.07	0.28	1.15	1.85
93.75	0.01	0.02	0.03	0.49	1.39	2.10

Panda negotiates the loan with the bank on 12 June (when the CU4m loan rate is fixed for the full nine months) and closes out the hedge.

What will be the outcome of the hedge and the effective loan rate if prices on 12 June are as follows:

Closing prices

	Case 1	*Case 2*
Spot price	7.4%	5.1%
Futures price	92.31	94.75

Solution

The following method should be used.

Step 1

Setup

(a)	Which contract?	June
(b)	What type?	As paying interest need a put option (the right to sell a future)
(c)	Strike price	93.25 (100 – 6.75) Cap needed at 6.75%
(d)	How many?	CU4m/CU0.5m × 9/3 = 24 contracts
(e)	Premium	At 93.25 (6.75%) June Puts = 0.14%

Contracts × premium × contract size × contract duration = 24 × 0.14% × CU500,000 × 3/12 = CU4,200

Note: As these are 3-month contracts, the premium – which is quoted as an annual rate – needs to be adjusted to reflect this.

Step 2

Closing prices

	Case 1	Case 2
Spot price	7.4%	5.1%
Futures price	92.31	94.75

Step 3

Outcome

		Case 1	Case 2
(a)	Options market outcome		
	Strike price right to sell (Put) at	93.25	93.25
	Closing price buy at	92.31	94.75
	Exercise?	Yes	No
	If exercised, gain on future	0.94%	–
	Outcome of options position	0.94% × CU500,000 × 3/12 × 24 = CU28,200	–
(b)	Net position	CU	CU
	Borrow spot CU4m × 9/12 × 7.4% or 5.1%	222,000	153,000
	Option	(28,200)	–
	Option premium	4,200	4,200
	Net outcome	198,000	157,200
(c)	Effective interest rate	$\frac{198,000}{4,000,000} \times \frac{12}{9} = 6.6\%$	$\frac{157,200}{4,000,000} \times \frac{12}{9} = 5.24\%$

7 Interest rate swaps

CHAPTER 9

Section overview

- **Interest rate swaps** are where two parties agree to exchange interest rate payments.
- Interest rate swaps can act as a means of **switching** from paying one type of interest to another, raising **less expensive loans** and **securing better** deposit **rates**.

Definition

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

7.1 Swap procedures

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

In the simplest form of interest rate swap, party A agrees to pay the interest on party B's loan, while party B reciprocates by paying the interest on A's loan. If the swap is to make sense, **the two parties must swap interest which has different characteristics**.

Assuming that the interest swapped is in the same currency, the most common motivation for the swap is to switch from paying floating rate interest to fixed interest or *vice versa*. This type of swap is known as a **'plain vanilla'** or **generic** swap.

The variable rate included in a swap is LIBOR – the London InterBank Offered Rate. This benchmark rate of interest is the rate paid between banks.

Like all financial instruments, swaps can be used for speculation as well as hedging.

7.2 Interest rate swaps

7.2.1 Advantages

- They enable a **switch** from **floating rate** to **fixed rate interest**, or *vice versa*, for use as a hedge against interest rate risk.
- The **arrangement costs** are **often significantly less** than terminating an existing loan and taking out a new one.
- They can be used to make **interest rate savings**, either out of the counterparty or out of the loan markets, by using the principle of comparative advantage.
- They are available for **longer periods** than the short-term methods of hedging risk (FRAs, futures, options) that we have considered in this chapter.
- They are flexible since they can be arranged for tailor made amounts and periods, and are reversible.

Worked example: Interest rate swaps

Company A has borrowed CU10 million at a fixed interest rate of 9% per annum. Company B has also borrowed CU10 million but pays interest at LIBOR + 1%. LIBOR is currently 8% per annum.

The directors of company A feel that interest rates are going to fall and would prefer to be paying floating rate interest. The best floating rate A could obtain without a swap is LIBOR + 2%. The feeling at company B is that interest rate risk could be removed if they were paying fixed interest and that this would facilitate cash planning. The best fixed rate that B could obtain without a swap is 10%.

The two companies agree to swap interest payments.

A pays LIBOR + 1% to B

B pays 9% to A

No loan principals are swapped and both parties retain the obligation to repay their original loans.
A summary of the arrangements can be shown as follows.

	Company A		Company B
Interest paid on original loan	(9%)		(LIBOR + 1%)
A pays to B	(LIBOR + 1%)	→	LIBOR + 1%
B pays to A	9%	←	(9%)
Net payment after swap	(LIBOR + 1%)		(9%)

Both parties have achieved their objective of switching the nature of their interest payments. Comparing the rate paid with the swap to the rate without, it can be seen that the swap has benefited both parties eg company B is paying 9% fixed instead of 10% fixed. Whether fixed is a good idea however depends on what LIBOR does.

If LIBOR stays at 8%, neither party gains or loses. However, if LIBOR falls, A gains at the expense of B and the reverse happens if LIBOR rises.

Summary	Company A	Company B
Before swap	9% fixed	LIBOR + 1% floating = 8 + 1 = 9%
After swap	LIBOR + 1% = 9% floating	9% fixed

Without swap	LIBOR + 2% = 10% floating	10% fixed

7.2.2 How do swaps work?

The gain arises due to the principle of comparative advantage. This allows two companies to work together to their mutual benefit.

Worked example: How interest rate swaps work

Goodcredit Ltd has been given a high credit rating. It can borrow at a fixed rate of 11%, or at a variable interest rate equal to LIBOR, which also happens to be 11% at the moment. It would like to borrow at a variable rate. Secondtier Ltd is a company with a lower credit rating, which can borrow at a fixed rate of 12.5% or at a variable rate of LIBOR plus 0.5%. It would like to borrow at a fixed rate.

A swap allows both parties to end up paying interest at a lower rate via a swap than is obtainable from a bank. Where does this gain come from? To answer this question, set out a table of the rates at which both companies could borrow from the bank.

	Goodcredit	Secondtier	Difference
Can borrow at fixed rate	11%	12.5%	1.5%
Can borrow at floating rate	LIBOR	LIBOR + 0.5%	0.5%
Difference between differences			1.0%

Goodcredit has a **better credit rating** than Secondtier in both types of loan market, but **its advantage** is **comparatively higher** in the fixed interest market. The 1% differential between Goodcredit's advantage in the two types of loan may represent a market imperfection or there may be a good reason for it. Whatever the reason, it represents a potential gain which can be made out of a swap arrangement.

	Goodcredit	Secondtier	Sum total
Company wants	Variable	Fixed	
Would pay (no swap)	(LIBOR)	(12.5%)	(LIBOR + 12.5%)
Could pay	(11%)	(LIBOR + 0.5%)	(LIBOR + 11.5%)
Potential gain			1%

Assume that the potential gain of 1% is split equally between Goodcredit and Secondtier, 0.5% each. Then Goodcredit will be targeting a floating rate loan of LIBOR less 0.5% (0.5% less than that at which it can borrow from the bank). Similarly, Secondtier will be targeting a fixed interest loan of 12.5% – 0.5% = 12%. These are precisely the rates which are obtained by the swap arrangement illustrated below.

	Goodcredit	Secondtier	Sum total
Split evenly	0.5%	0.5%	1%
Expected outcome	(LIBOR – 0.5%)	(12%)	(LIBOR + 11.5%)

The rate that each company expects to pay after the swap is thus 0.5% less than it would pay without a swap.

eg Goodcredit would pay LIBOR, so will pay LIBOR – 0.5%
Secondtier would pay 12.5% fixed so will pay 12% fixed

Swap terms	Goodcredit	Secondtier	Sum total
Could pay	(11%)	(LIBOR + 0.5%)	(LIBOR + 11.5%)
Swap floating	(LIBOR + 0.5%)	LIBOR + 0.5%	
Swap fixed	12%	(12%)	

Net paid	(LIBOR – 0.5%)	(12%)	(LIBOR + 11.5%)
Would pay	(LIBOR)	(12.5%)	(LIBOR + 12.5%)
Gain	0.5%	0.5%	1%

To construct a simple swap:

Let Goodcredit pay all of Secondtier's interest

ie LIBOR + 0.5% paid to Secondtier, as shown above

Secondtier must then reciprocate by paying fixed interest to Goodcredit. However, Secondtier will only pay 12% as calculated and shown above, in order to be 0.5% better off under the swap.

The overall effect of this is to leave each party 0.5% better off.

The results of the swap are that Goodcredit ends up paying variable rate interest, but at a lower cost than it could get from a bank, and Secondtier ends up paying fixed rate interest, also at a lower cost than it could get from investors or a bank.

Note that for the swap to give a gain to both parties:

(a) Each company must borrow in the loan market in which it has **comparative advantage**. Goodcredit has the greatest advantage when it borrows fixed interest. Secondtier has the least disadvantage when it borrows floating rate.

(b) The parties must actually **want** interest of the opposite type to that in which they have comparative advantage. Goodcredit wants floating and Secondtier wants fixed.

Once the target interest rate for each company has been established, there is an infinite number of swap arrangements which will produce the same net result. The example illustrated above is only one of them.

Interactive question 5: Construct a swap

[Difficulty level: Intermediate]

We illustrated above one way in which the swap could work. (Swap fixed 12%, swap floating (LIBOR + 0.5%). Suggest an alternative arrangement for the swap by entering swap interest payments into this *pro-forma* to move from the original interest paid to the desired result.

	Goodcredit	Secondtier
Could pay	(11%)	(LIBOR + 0.5%)
Swap floating		
Swap fixed		
Net interest cost	(LIBOR – 0.5%)	(12%)

See **Answer** at the end of this chapter.

Interactive question 6: Practise creating a swap

[Difficulty level: Intermediate]

A Ltd wishes to borrow fixed but, because of its credit rating, the best rate it can obtain is 11% pa. It can borrow variable at LIBOR +2%. B Ltd can borrow fixed at 9% or variable at LIBOR +1%. B Ltd is happy to borrow variable.

Assume both wish to borrow CU10m.

Requirement

Illustrate how a swap would benefit both parties, assuming the following:

1 A Ltd borrows CU10m variable at LIBOR +2%

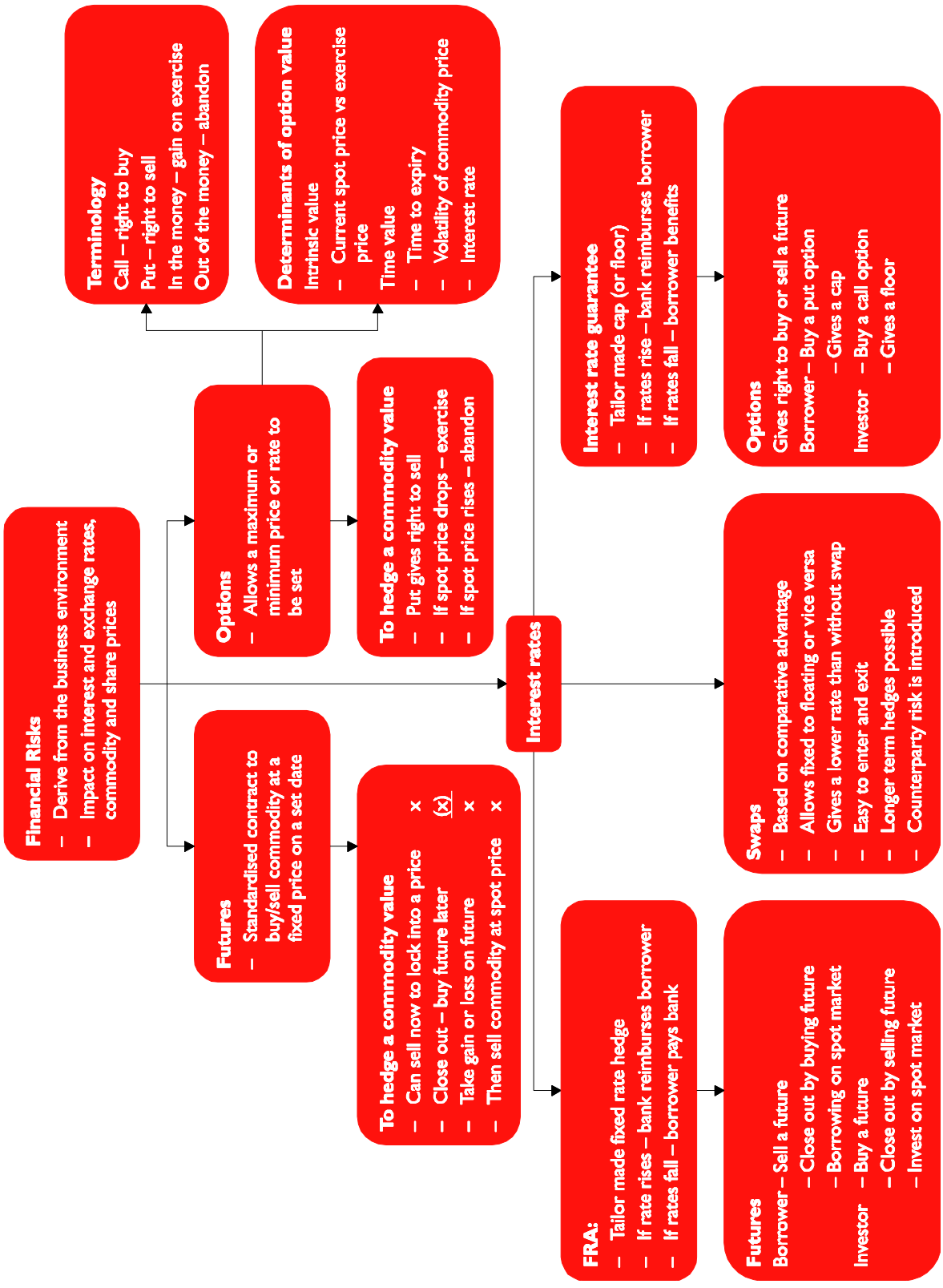
2 B Ltd borrows CU10m fixed at 9%

See **Answer** at the end of this chapter.

7.3 Risks of swaps

Risks associated with swaps	
Counterparty risk	Risk that counterparty to swap will default before completion of agreement. This risk is lessened by using a reputable intermediary
Position or market risk	Risk of unfavourable market movements of interest or exchange rates after the company enters a swap.
Transparency risk	Risk that swap activity may lead to accounts of party involved being misleading

Summary


Financial Risks
– Derive from the business environment
– Impact on interest and exchange rates, commodity and share prices
Options
– Allows a maximum or minimum price or rate to be set
Terminology
Call – right to buy
Put – right to sell
In the money – gain on exercise
Out of the money – abandon
Determinants of option value
Intrinsic value
– Current spot price vs exercise price
Time value
– Time to expiry
– Volatility of commodity price
– Interest rate
To hedge a commodity value
– Put gives right to sell
– If spot price drops – exercise
– If spot price rises – abandon
Futures
– Standardised contract to buy/sell commodity at a fixed price on a set date
To hedge a commodity value
– Can sell now to lock into a price x
– Close out – buy future later (x)
– Take gain or loss on future x
– Then sell commodity at spot price x
Interest rates
Interest rate guarantee
– Tailor made cap (or floor)
– If rates rise – bank reimburses borrower
– If rates fall – borrower benefits
Options
Gives right to buy or sell a future
Borrower – Buy a put option
– Gives a cap
Investor – Buy a call option
– Gives a floor
Swaps
– Based on comparative advantage
– Allows fixed to floating or vice versa
– Gives a lower rate than without swap
– Easy to enter and exit
– Longer term hedges possible
– Counterparty risk is introduced
FRA:
– Tailor made fixed rate hedge
– If rate rises – bank reimburses borrower
– If rates fall – borrower pays bank
Futures
Borrower – Sell a future
– Close out by buying future
– Borrowing on spot market
Investor – Buy a future
– Close out by selling future
– Invest on spot market

Self-test

Answer the following questions.

1 A company wants to secure minimum earnings on deposits of CU10 million it will be making in four months' time (mid-December) for an investment period of three months (to mid-March). Which of the following would be suitable methods of hedging the exposure to a fall in interest rates over the next four months?

A Selling September short sterling futures

B Buying a call option on December sterling futures

C Buying a put option on September sterling futures

D Buying December short sterling futures

2 The treasurer of a US-based multinational expects to deposit about CU30 million in cash in May for a number of months, and is worried that short-term interest rates on sterling will soon fall. It is now December. Which of the following would be an appropriate hedging transaction with futures?

A Sell June sterling futures

B Sell March sterling futures

C Buy March sterling futures

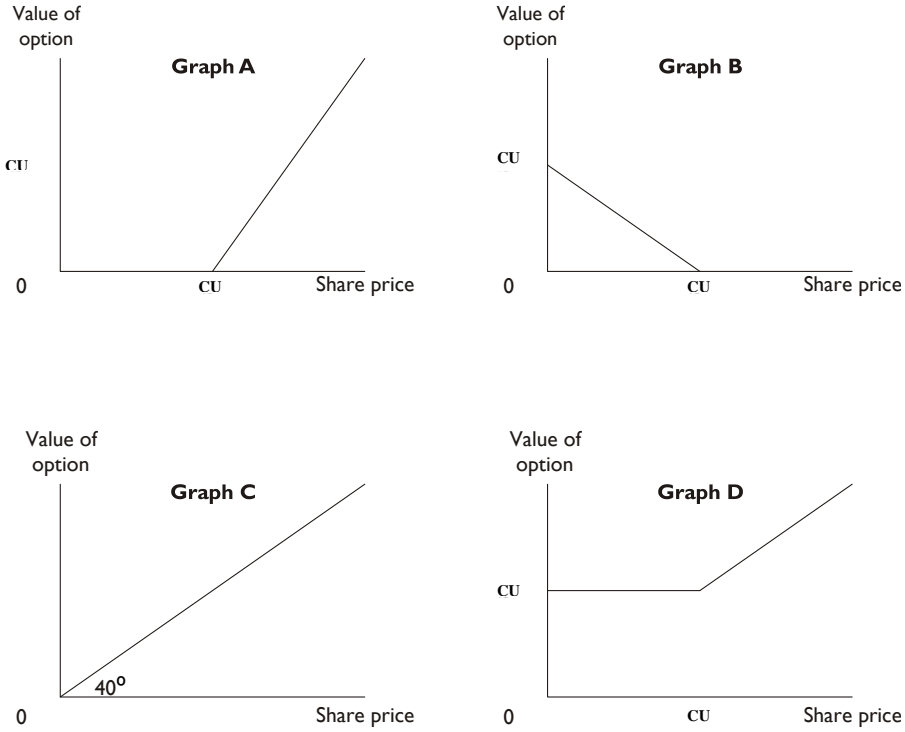
D Buy June sterling futures

3 A bank has quoted the following rates for dealing in FRAs.

	Bid	Offer
3 v 6	4.59	4.56

It is 24th March and your company wants to fix an interest rate for borrowing CU1 million for three months from 24th June. What is the payment to be made on the FRA if the company entered a 3 v 6 FRA with a bank, assuming that interest rates rise to 4.65% from their current level of 4.5%?

4 An investor holds put options giving him the right to sell shares in a company for CU2 each. Which of the following graphs correctly shows how the value of the put options at expiry date will depend on the share price?



A Graph A

B Graph B

C Graph C

D Graph D

5 Mover Investments Ltd wants to secure minimum earnings on deposits of CU15 million it will be making in four months' time (mid-December) for an investment period of three months (to mid-March). Which of the following would be suitable methods of hedging the exposure to a fall in interest rates over the next four months?

A Buying December short sterling futures

B Buying a 3 v 7 FRA

C Selling December short sterling futures

D Selling a 4 v 7 FRA

E Buying a call option on September short sterling futures

6 A company needs to borrow CU50m for one year starting in three months' time at LIBOR.

The company's bank makes the following offers.

- A '3-15' FRA at 5% interest (ie an FRA starting in three months and lasting twelve months).
- An option at 5% interest for a premium of 1% pa.

Requirement

Assuming interest rates move to either 3%, 4%, 5% or 6%, illustrate the effective rate paid by the company assuming it

(a) Has no hedge

(b) Uses an FRA

(c) Uses an option

7 High Risk Ltd and Sound Co Ltd both wish to borrow CU10m indefinitely. They are considering entering into a swap arrangement under which any gains would be shared equally between the two companies.

Requirement

Show the effect of a swap arrangement between the two companies if

1 High Risk Ltd borrows CU10m variable at LIBOR. It prefers fixed, which it can raise at 9%

2 Sound Co Ltd borrows CU10m fixed at 8%. It prefers variable, which it can raise at LIBOR +1%

8 It is late March and a corporate treasurer has identified the need to borrow CU10 million for a three month period commencing at the end of June. Current (ie spot) interest rates are 6% per annum. Three month sterling interest rate futures for June are trading at 93. Futures contracts size is CU500,000.

Explain how futures will provide a hedge. Assume the spot rate moves to 6%, 7% and 8% to help illustrate your answer.

9 An investor holds a portfolio of FTSE 100 shares with a value of CU24 million at the end of March. He is worried that by the end of June, when he plans to sell his shares to raise cash, share prices will have fallen. He is considering FTSE 100 index futures to hedge against this risk of capital loss.

The current value of the FTSE 100 index is 6,000.

The index value for contracts to be completed at the end of June is 5,900 and the price of futures is CU10 per full index point.

Illustrate how a hedge helps protect against a drop in equity values. Assume that at the end of June the portfolio value has dropped to CU23.58 million, and the June future is quoted at 5,795.

10 It is 31 December. Cleff Ltd needs to borrow CU6 million in three months' time for a period of six months. For the type of loan finance which Cleff would use, the rate of interest is currently 13% per year and the corporate treasurer is unwilling to pay a higher rate.

The treasurer is concerned about possible future fluctuations in interest rates, and is considering the following possibilities:

(a) Forward rate agreements (FRAs)

(b) Interest rate futures

(c) Interest rate guarantees or short-term interest rate caps

Requirement

Explain briefly how each of these three alternatives might be useful to Cleff Ltd.

11 The corporate treasurer of Cleff decides on 31 December to hedge the interest rate risk on the CU6 million to be borrowed in three months' time for six months by using interest rate futures. Her expectation is that interest rates will increase from 13% by 2% over the next three months.

The current price of March sterling 3-months futures is 87.25. The standard contract size is CU500,000.

(a) Set out calculations of the effect of using the futures market to hedge against movements in the interest rate:

(i) If interest rates increase from 13% by 2% and the futures market price moves by 2%

(ii) If interest rates increase from 13% by 2% and the futures market price moves by 1.75%

(iii) If interest rates fall from 13% by 1.5% and the futures market price moves by 1.25%

The time value of money, taxation and margin requirements can be ignored.

(b) Calculate, for the situations above, whether the total cost of the loan after hedging would have been lower with the futures hedge chosen by the treasurer or with an interest rate guarantee which she could have purchased at 13% for a premium of 0.25% of the size of the loan to be guaranteed.

Again, the time value of money, taxation and margin requirements are to be ignored.

12 (a) It is September 20X9. Rutini's corporate treasurer has identified the need to invest CU20m sterling for a three-month period commencing at the end of December. Current interest rates are 3% per annum.

Three-month December sterling interest rate futures are trading at 3.375%. Three-month put options with an exercise price of 3.375% cost CU500 per contract; calls of a similar denomination cost CU350 per contract. The contract size is CU500,000.

Demonstrate the results of covering the treasurer's exposure using

(i) Futures, and

(ii) Options

under the following December spot interest rates:

(1) 3.25%

(2) 3.375%

(3) 3.5%

Ignore basis risk at end of December for the purposes of this illustration. **(4 marks)**

(b) It is September 20X0. The corporate treasurer of another company has identified the need to borrow CU20m of sterling for three months, commencing end of December. The same data apply as for Rutini's treasurer in (a).

Demonstrate the results of covering the treasurer's exposure using

(i) Futures, and
(ii) Options

under the following December spot interest rates:

(1) 3.25%
(2) 3.375%
(3) 3.5% **(4 marks)**

(c) Rutini's treasurer holds 2,000 X Ltd shares, current market price CU13.00 per share. He intends to sell them in three months' time but is worried about their price volatility. The following three-month options are available.

Exercise price CU	Premium per share CU
12.00	0.50
13.00	1.00
14.00	1.50

Calculate the treasurer's net receipt in three months' time if he takes no hedging action or if he employs each of the options.

Tabulate your results for the following three month prices:

CU10 CU11 CU12 CU13 CU14 CU15

Comment on which policy appears most suitable. **(4 marks)**

(d) One of Rutini's directors believes that X Ltd's share price will be exceptionally volatile over the next three months. He buys

1,000 X Ltd call options exercise price CU13.00, premium 50p per share
1,000 X Ltd put options exercise price CU13.00, premium 50p per share

Calculate his profit under the following three-month share prices:

CU11 CU12 CU13 CU14 CU15

Comment on your result. **(4 marks)**

(16 marks)

13 Swapit Ltd has a high credit rating. It can borrow fixed at 10% or variable at LIBOR + 0.3%. It would like to borrow variable.

Badcred Ltd has a lower credit rating. It can borrow fixed at 11% or variable at LIBOR + 0.5%. It would like to borrow fixed.

Requirement

Show how a swap arrangement would benefit both parties if Swapit Ltd were to borrow fixed, paying Badcred Ltd LIBOR, and Badcred Ltd were to borrow variable, paying 10.1% fixed to Swapit Ltd. **(3 marks)**

14 Swapper Ltd has a fixed rate loan of CU10,000,000 at 14%, which must be redeemed one year hence. The company is considering an interest rate swap with Mover Ltd, which has a floating rate loan of the same size at LIBOR plus 1%. If the swap goes ahead, Mover Ltd will pay Swapper Ltd 13% and Swapper Ltd will pay Mover Ltd LIBOR plus 1½%. Swapper Ltd could issue floating rate debt at LIBOR plus 2% and Mover Ltd could issue fixed rate debt at 13½%.

There would be legal fees of CU10,000 for each company if the swap is made.

Requirement

(a) Would the swap benefit Swapper Ltd:

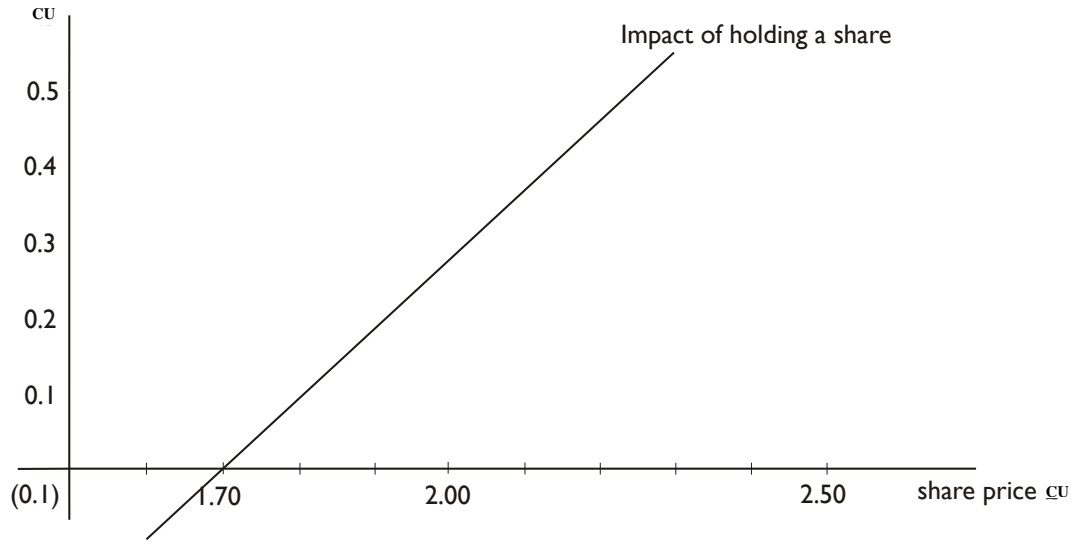
(1) if LIBOR is 12% for the next year
(2) if LIBOR is 12% for the next six months, and 10% thereafter?

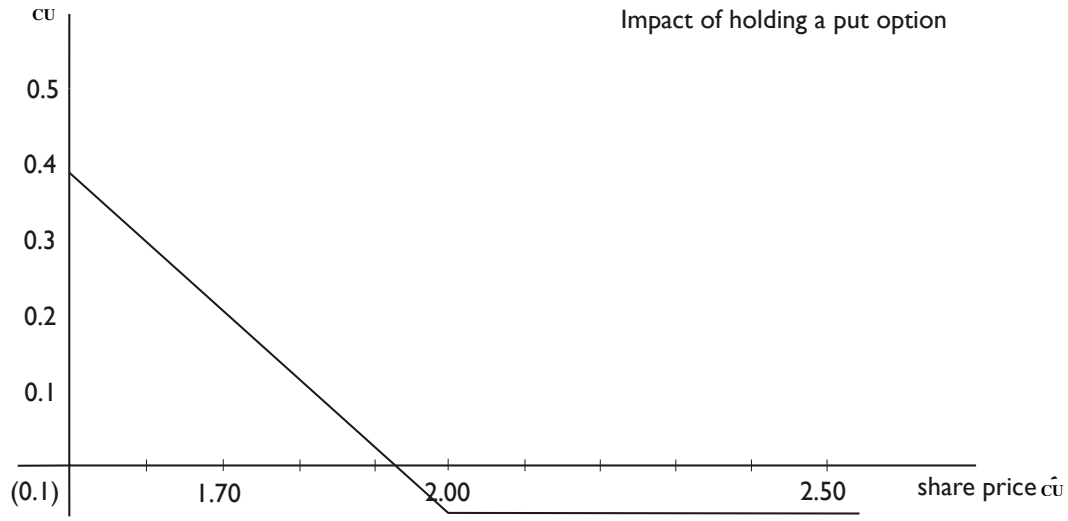
(b) Could an alteration in the terms of the swap make it beneficial to both companies? Any benefit would be shared equally between them. **(10 marks)**

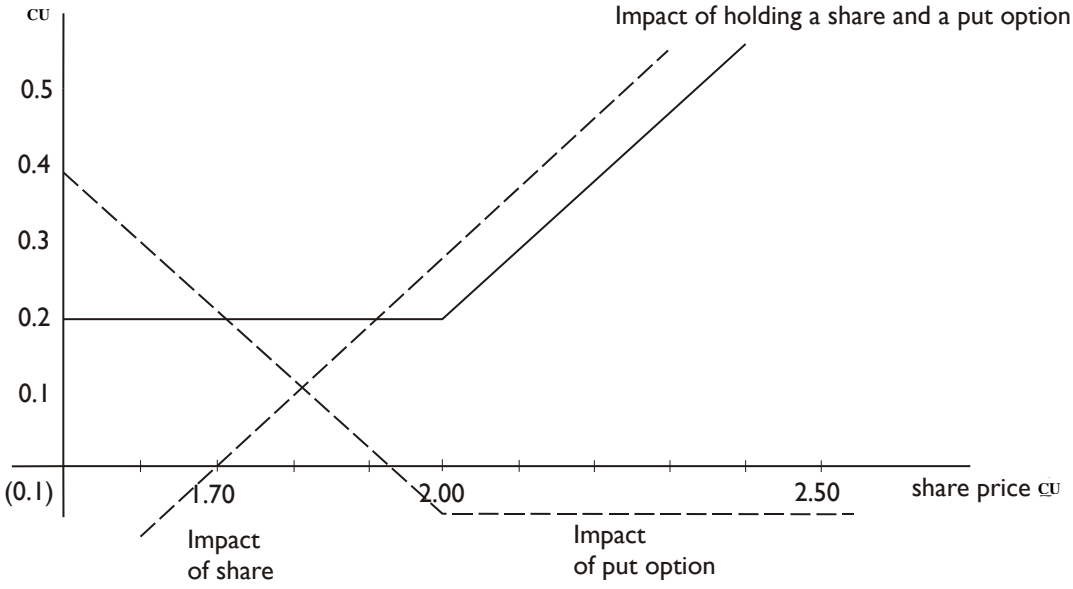
Now go back to the Learning Objectives in the Introduction. If you are satisfied you have achieved these objectives, please tick them off.

Answers to Interactive questions

Answer to Interactive question 1







	CU	CU	CU
Share price	(1.70)	(2.00)	(2.50)
Sell at exercise price	2.00	2.00	2.00
Gain if exercise	0.30	0	0
			Abandon
Less: premium	(0.10)	(0.10)	(0.10)
	0.20	(0.10)	(0.10)

Answer to Interactive question 2

$$\text{Number of futures contracts} = \frac{£17\text{m} \times 2 \text{ months}}{£0.5\text{m} \times 3 \text{ months}}$$

= 22.67 contracts, rounded to 23.

Answer to Interactive question 3

The following steps should be taken.

(a) **Setup**

(i) What contract: 3-month contract

(ii) What type? sell (as rates expected to rise)

(iii) How many contracts?: $\frac{\text{Exposure}}{\text{Contract size}} \times \frac{\text{Loan period}}{\text{Length of contract}} = \frac{10\text{m}}{0.5\text{m}} \times \frac{6}{3}$ = 40 contracts

(b) **Futures outcome**

At opening rate:	91 sell
At closing rate:	89 buy
Gain:	2%

Futures outcome: 2% × CU0.5m × 3/12 × 40 contracts = CU100,000

(c) **Net outcome**

	CU
Payment in spot market CU10m × 11% × 6/12	(550,000)
Receipt in futures market	100,000
Net payments	(450,000)

Spot rate at 1st January = 8%
31 March = 11%

Increase in interest on spot market = 3%

Increase in cost = 3% × CU10m × 6/12 = CU150,000

Hedge efficiency: $\frac{\text{Gain on future}}{\text{Losson spot market}} = \frac{100{,}000}{150{,}000} \times 100\% = 67\%$

Answer to Interactive question 4

The target interest to be earned is CU2 million × 5% × $^{3}/_{12}$ = CU25,000. To hedge lending, buy four 3-month sterling September futures contracts now and sell four contracts in August.

Suppose that by August, interest rates have fallen by 1%. The CU2 million is deposited at 4% for three months, yielding CU20,000, a shortfall on target of CU5,000. If the futures market has also moved by 1%, the contract price will have risen to 95.00, giving a gain of 1%. The gain from selling four contracts at the higher price is 1% × 3/12 × CU0.5m × 4 contracts = CU5,000. This compensates for the shortfall in actual interest.

Answer to Interactive question 5

Enter any figure into any slot of the pro-forma and the other figures must automatically balance out. Here is one of many possible solutions.

	Goodcredit	Secondtier
Could pay	(11%)	(LIBOR + 0.5%)
Swap floating	(LIBOR – 0.5%)	LIBOR – 0.5%
Swap fixed	11%	(11%)
Net interest cost	(LIBOR – 0.5%)	(12%)

Answer to Interactive question 6

A pays 2% more for fixed debt, but only 1% more for variable debt. There is therefore a 1% possible gain from a swap, that we will split evenly between the two participants.

	A Ltd	B Ltd
Borrow	(LIBOR + 2%)	(9%)
Swap floating	LIBOR + ½%	(LIBOR + ½%)
Swap fixed	(9%)	9%
Net interest cost	(10½%)	(LIBOR + ½%)

Answers to Self-test

1 B Buying a call option on December sterling futures

D Buying December short sterling futures

The exposure to a fall in short-term interest rates can be obtained by selling a 4 v 7 FRA, buying December futures or buying a call option on December futures. Dealing in September futures or options does not provide sufficient cover against the interest rate exposure.

2 D Buy June sterling futures.

An exposure to a decrease in short-term interest rates can be hedged by purchasing short-term interest rate futures. June futures are more appropriate than March futures because with March futures, there will be an exposure to a fall in the interest rate after the contract expires in March and before the deposit of cash is made in May. The company will close its position in May by selling sterling futures.

3 A company is borrowing therefore it will buy an FRA which locks it into a fixed borrowing rate. The spread offered by the bank will allow the bank to make a profit, thus:

- Depositors will receive the lower rate: 4.56%
- Borrowers will pay the higher rate: 4.59%

If interest rates in June rise to 4.65% the bank will reimburse the company:

(4.65% – 4.59%) × 3/12 × CU1 million = CU150

4 B Graph B

Put options give the right to sell shares at a fixed price, here CU2 per share. The option has value for the investor at the expiry date provided that the actual market value is less than the exercise price of CU2 per share giving the investor the ability to 'profit' by exercising the option. This is shown by Graph B.

Graph A shows how the value at expiry date of a call option at CU2 per share varies with the actual share price. Graph D shows the combined value of the option plus the share: the put option safeguards the investor against a fall in price of the shares below CU2, which illustrates the advantage of put options to an investor seeking to hedge against share price falls.

For put options and call options before their expiry date, the lines in Graph B and Graph A respectively show the minimum values at which the options will be traded.

5 D Selling a 4 v 7 FRA and

A Buying December short sterling futures.

The exposure to a fall in short-term interest rates can be obtained by selling a 4 v 7 FRA, buying December futures or buying a call option on December futures. Dealing in September futures or options does not provide sufficient cover against the interest rate exposure.

6

LIBOR in three months	6%	5%	4%	3%
	%	%	%	%
(a) No hedge – pay the rate of interest	6	5	4	3
(b) FRA				
Pay at the rate of interest	6	5	4	3
(Paid by)/Paid to bank (LIBOR v 5%)	(1)	(0)	1	2

Effective rate	5	5	5	5

(c) Option

Exercise?	Yes	No	No	No
Rate	5	5	4	3
Premium	1	1	1	1
Effective rate	6	6	5	4

The no hedge position has the greatest risk as shown by a much wider spread of outcomes. The FRA gives a fixed rate, and the option provides a cap. The effective cost of the option is increased significantly by the premium.

7

High Risk	Sound Co.		
Assume wants fixed	Assume wants variable		Combined
9% fixed	LIBOR + 1%	=	LIBOR +10%
LIBOR	8% fixed	=	LIBOR + 8%
			Gain = 2%

Assuming gain of 2% is shared equally, rates with swap:

9 – 1% = 8% fixed LIBOR + 1% – 1% = LIBOR

	High Risk		Sound Co		
• Borrow where comparative advantage lies	(LIBOR)	+	(8% fixed)	=	LIBOR + 8%
• Swap: Sound Co pays High Risk's interest.	LIBOR	←	(LIBOR)		
High Risk pays Sound Co.	(8%) fixed	→	8% fixed		
• Rate with swap	(8%) fixed +		(LIBOR%)	=	LIBOR + 8%
• Rate without swap	(9%) fixed +		(LIBOR + 1%)	=	LIBOR + 10%
• Overall gain					1% + 1% = 2%

A variety of swaps are possible. This is just one of them

Each now has cheaper borrowing in the preferred form (fixed or variable). This is simply an example of comparative advantage.

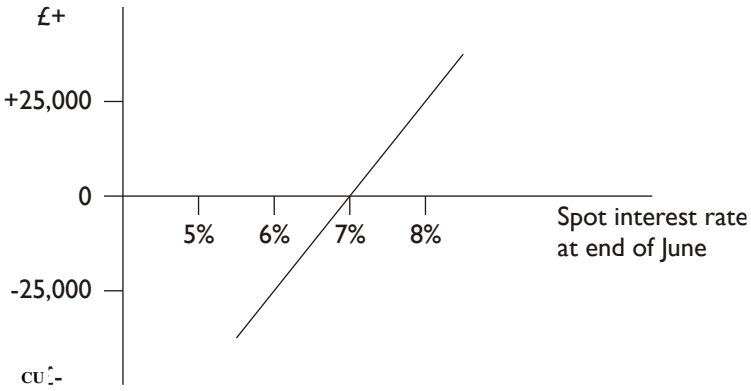
8 The underlying instrument for an interest rate future is normally a bond, ie a piece of debt. Selling futures is equivalent to selling (or issuing) debt, ie borrowing money.

If each futures contract is for CU500,000 the treasurer should sell CU10m ÷ CU500,000 = 20 contracts. Each contract enables the treasurer to effectively borrow CU500,000 for a three-month period from the end of June.

Profits/losses on futures contracts

Spot rate r	6%	7%	8%
Sell a future (note: a price of 93 implies a rate of 7%)	93	93	93
Close out, by buying the future back at the closing rate ie: 100 – r	(94)	(93)	(92)
Effect of futures	(1%)	–	1%
Borrow at spot rate	(6%)	(7%)	(8%)
Overall effect	(7%)	(7%)	(7%)

CU



At 7% spot Agreed to borrow CU10m for three months at 7%, spot is 7% ∴ no gain/no loss

At 6% spot Agreeing to pay extra 1% on CU10m for three months = CU10m × $\frac{3}{12}$ × 1% = CU25,000

At 8% spot Saving 1% on CU1m for three months = CU25,000

9 To illustrate how the trading in futures helps the investor to hedge against the risk of adverse price movements, consider the following:

Number of contracts required

Value of portfolio at March	=	CU24,000,000
Value of contract		
• Futures price of FTSE 100 index	=	5,900
• Value of each point	=	CU10
• Value of a contract	=	CU59,000
Number of contracts	=	CU24 million/CU59,000 = 406.8 round to 407

Futures position

March –	Investor will sell 407 June contracts	5900
June –	Investor will close out and buy June contracts	5795
	Drop in price of FTSE Index futures	105 points

Value of futures gain = 105 × CU10 × 407 contracts = CU427,350

Overall position in June

Value of portfolio	=	CU23,580,000
Gain on futures	=	CU427,350
Overall value	=	CU24,007,350

$$\text{Efficiency} = \frac{\text{Gain on future}}{\text{Loss on portfolio}} \times \frac{\text{CU}427{,}350}{\text{CU}24\text{m} - 23.58\text{m}} = 101.75\%$$

The hedge is more than 100% efficient because of basis and rounding of the number of contracts.

10 **Forward rate agreements (FRAs)**

Entering into an FRA with a bank will allow the treasurer of Cleff Ltd effectively to lock in an interest rate for the six months of the loan. This agreement is independent of the loan itself, upon which the prevailing rate will be paid. If the FRA were negotiated to be at a rate of 13%, and the actual interest rate paid on the loan were higher than this, the bank will pay the difference between the rate paid and 13% to Cleff Ltd. Conversely, if the interest paid by Cleff turned out to be lower than 13%, they would have to pay the difference to the bank. Thus the cost to Cleff will be 13%.

Interest rate futures

Interest rate futures have the same effect as FRAs, in effectively locking in an interest rate, but they are standardised in terms of size, duration and terms. They can be traded on an exchange (such as LIFFE in London), and they will generally be closed out before the maturity date, yielding a profit or loss that is offset against the loss or profit on the money transaction that is being hedged. So, for example, as Cleff is concerned about rises in interest rates, the treasurer can sell future contracts now; if that rate does rise, their value will fall, and they can then be bought at a lower price, yielding a profit which will compensate for the increase in Cleff's loan interest cost. If interest rates fall, the lower interest cost of the loan will be offset by a loss on their futures contracts.

Interest rate guarantees

Interest rate guarantees (or short term interest rate options) give Cleff the opportunity to benefit from favourable interest rate movements as well as protecting them for their effects on adverse movements. They give the holder the right but not the obligation to deal at an agreed interest rate at a future maturity date. This means that if interest rates rise, the treasurer would exercise the option, and 'lock in' to the predetermined borrowing rate. If, however, interest rates fall, then the option would simply lapse, and Cleff would feel the benefit of lower interest rates.

11 (a) **Hedge using the futures market**

		(i)	*(ii)*	*(iii)*
Setup				
Which contract		March		
What type		Sell		
How many contracts		$\frac{\text{Exposure}}{\text{Contract size}} \times \frac{\text{Loan period}}{\text{Length of contract}}$ $= \frac{\text{CU}6{,}000{,}000}{\text{CU}500{,}000} \times \frac{6}{3}$ = 24 contracts		
Closing prices		(87.25 – 2) 85.25	(87.25 – 1.75) 85.50	(87.25 + 1.25) 88.50
Outcome				
(i)	Futures outcome			
	At opening rate	87.25	87.25	87.25
	At closing rate	85.25	85.50	88.50
	Futures movement	2% profit	1.75% profit	1.25% loss
	Futures outcome	2% × 3/12 × CU500,000 × 24 contracts = CU60,000 profit	1.75% × 3/12 × CU500,000 × 24 contracts = CU52,500 profit	(1.25%) × 3/12 × CU500,000 × 24 contracts = CU37,500 loss
		CU	CU	CU
(ii)	Net outcome			
	Payment in spot market	(450,000)	(450,000)	(345,000)
	CU6 million × 6/12 × 15% ((a) and (b))/11.5% (c)			
	Receipt in futures market	60,000	52,500	(37,500)
	Net payment	(390,000)	(397,500)	(382,500)
(iii)	Hedge efficiency	$\frac{60{,}000}{60{,}000\ *}$ = 100%	$\frac{52{,}500}{60{,}000\ *}$ = 87.5%	$\frac{37{,}500}{45{,}000\ **}$ = 83.3%

* 60,000 = CU6m × 6/12 × (15 – 13)%

** 45,000 = CU6m × 6/12 × (13 – 11.5)%

(b) **Futures hedge costs**

(i)	Interest CU6m × 15% × $^{6}/_{12}$	CU450,000
	Less gain CU60,000	= **CU390,000**

(ii) Interest (as in (a)) CU450,000
Less gain CU52,500 = **CU397,500**

(iii) Interest CU6m × 11.5% × $^{6}/_{12}$ = CU345,000
Add loss CU37,500 = **CU382,500**

IRG hedge costs

The premium for the guarantee is:

CU6m × 0.25% = CU15,000.

The guarantee would be used in cases (i) and (ii) when interest rates increase.

Then, total cost limiting interest rates to 13% is:

CU6m × 13% × $^{6}/_{12}$ = CU390,000
Plus premium CU15,000 equals CU405,000.

This costs more than the futures contracts hedge in cases (i) and (ii).

In case (iii), the guarantee is not used.

Interest costs at 11.5% are:

CU6m × 11.5% × $^{6}/_{12}$ = CU345,000
Plus CU15,000 premium = CU360,000.

This costs less than the futures hedge, reflecting the fact that declining to take up the interest rate option in the case of the guarantee has allowed the company to take advantage of the lower interest rates in the cash market.

12 (a) **Rutini's treasurer**

Buying futures gives an obligation to buy bonds (ie invest money) at 3.375%. No matter what the spot interest rate in December is, assuming the futures are held to maturity, the funds will yield 3.375%.

Impact of hedging with futures	Interest rate at end of December		
	3.25%	3.375%	3.5%
September – Buy futures at 100 – 3.375%	(96.625)	(96.625)	(96.625)
December – Sell future at closing price	96.75	96.625	96.50
(100 – spot rate)	0.125%	0	(0.125%)
	gain		loss
Overall effect			
Borrow at spot rate	3.25%	3.375%	3.5%
Impact of futures rate	0.125%	0	(0.125%)
	3.375%	3.375%	3.375%

The interest received is 3.375% × 3/12 × CU20 million invested = 168,750

Call options will give the right, but not the obligation, to invest at 3.375%. If interest rates rise above this level the options will be abandoned. Below this level they will be exercised.

$$\text{Number required} = \frac{£20\text{m}^{CU}}{£0.5\text{n}^{CU}}$$

= 40 contracts

The value of the call option – the right to buy a future for 96.625 – is apparent from the above table. The option will be exercised if a gain can be made ie if rates drop, but will be abandoned if rates rise to 3.5%. In this case, the interest received on a CU20 million investment would be

CU20 million × 3.5% × 3/12 = CU175,000

The cost of the option is CU350 × 40 contracts = CU14,000.

Future spot rate	Action	Net pay off on three month investment CUm	% return
3.25%	Exercise option	0.16875 – 0.014 = 0.15475	3.095
3.375%	Exercise or abandon option	0.16875 – 0.014 = 0.15475	3.095
3.5%	Abandon option	0.175 – 0.014 = 0.161	3.22

(b) **Another treasurer**

Selling futures gives the obligation to sell bonds (ie borrow money) at 3.375%. No matter what the spot interest rate is in December, the treasurer could borrow at 3.375%.

Put options give the right, but not the obligation, to borrow at 3.375%. If interest rates rise above this they will be exercised; below this they will be abandoned. Again, 40 contracts will be needed.

Future spot rate	Action	Net cost of three-month loan CUm	% cost
3.25%	Abandon option	0.1625 + 0.02 = 0.1825	3.65
3.375%	Exercise or abandon option	0.16875 + 0.02 = 0.18875	3.775
3.5%	Exercise option	0.16875 + 0.02 = 0.18875	3.775

(c) **X Ltd shares**

	Pay offs : Share price CU'000					
Strategy	CU10	CU11	CU12	CU13	CU14	CU15
No cover	20	22	24	26	28	30
CU12.00 option	23	23	23	25	27	29
CU13.00 option	24	24	24	24	26	28
CU14.00 option	25	25	25	25	25	27

The suitability of the strategy depends upon the treasurer's attitude to risk and the probability of each share price. The higher the exercise price of the option the greater the protection given, but the smaller the participation in favourable price movements.

(d) **Rutini director**

Three-month share price CU	*Profit/(loss) on call* CU	*Profit/(loss) on put* CU	*Net pay off* CU
11	(500)	1,500	1,000
12	(500)	500	0
13	(500)	(500)	(1,000)
14	500	(500)	0
15	1,500	(500)	1,000

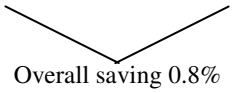
Comment

The treasurer has employed a 'straddle'. He will profit if the share price rises above CU14.00 or falls below CU12.00. Otherwise he will lose.

Note: The writer of the straddle will profit from stability.

13

	Swapit Ltd	Badcred Ltd
Borrows at	10%	LIBOR + 0.5%
Receives	(10.1%)	(LIBOR)
Pays	LIBOR	10.1%
	LIBOR – 0.1%	10.6%



14 (a) With LIBOR at 12% for the next year, the cost with the swap would be as follows.

	CU'000
Interest: 10,000 × (14 – 13 + 12 + 1½)%	1,450
Fee	10
	1,460

With LIBOR at 12% for six months and at 10% thereafter, the cost with the swap would be as follows.

	CU'000
Interest: 10,000 × (14 – 13 + (12 + 10)/2 + 1½)%	1,350
Fee	10
	1,360

Without the swap, the cost would be CU10,000,000 × 14% = CU1,400,000.

The swap would therefore be disadvantageous to Swapper Ltd if LIBOR were to remain at 12% throughout the year, but advantageous were LIBOR to fall to 10% after six months.

(b) Possible new terms would be for Swapper Ltd to receive 13% and pay LIBOR + ¾%. The net cost would be LIBOR + ¾% + (14 – 13)% = LIBOR + 1¾%, which is ¼% less than the rate at which the company could raise floating rate debt.

Mover Ltd would then effectively have fixed rate debt at 13% + (1 – ¾)% = 13¼%, which is ¼% less than the rate at which it could otherwise have such debt.

CHAPTER 10

Managing financial risk: overseas trade

Introduction

Examination context

Topic List

1 Exchange rates
2 Risk and foreign exchange
3 Forwards and futures
4 Hedging using the money markets
5 Currency options
6 Hedging economic and translation exposure

Summary and Self-test

Answers to Interactive questions

Answers to Self-test

Introduction

Learning objectives

	Tick off
• To explain the key risks deriving from foreign exchange movements	☐
• To explain how financial investment can be used to hedge against foreign exchange risk	☐
• To demonstrate how hedges work using non-complex calculations	☐
• To identify appropriate methods of managing the risks of overseas trade	☐

The syllabus references relevant to this chapter are 1i, 2a, b, d.

Syllabus links

The reporting and auditing of hedging techniques is explored in Financial Accounting, Financial Reporting and in Audit and Assurance. The techniques introduced in this chapter are taken further at Advanced level, in assessing a business' overarching hedging strategy.

Examination context

In the exam you may be asked to explain and illustrate how hedges work in a straightforward scenario. Knowledge of how to construct a hedge and how to choose between different hedges may be tested.

1 Exchange rates

Section overview

- The rates at which dealers buy and sell currency are known as the bid and offer prices.
- Most currencies are quoted in indirect terms from a Bangladesh perspective.
- Changes in exchange rates create risk to importers and exporters.

1.1 Quoting exchange rates

An **exchange rate** is the rate at which one country's currency can be traded in exchange for another country's currency.

The **spot rate** is the exchange rate currently offered on a particular currency. It is the rate quoted for **immediate delivery** of the currency.

The **forward rate** is an exchange rate set for currencies to be exchanged at a future date.

Every traded currency in fact has many exchange rates. There is an exchange rate with every other traded currency on the foreign exchange markets. Foreign exchange dealers make their profit by buying currency for less than they sell it, and so there are really two exchange rates, **a buying rate and a selling rate**.

These are known as the bid – offer prices respectively. The price between these two is known as the mid-point and it is often quoted as the exchange rate, although no trading will take place at the mid-point.

Worked example: Foreign exchange quotes

A Bangladeshi bank quoted a spot spread for dollars of $1.7935 – $1.8075 which allows it to make a gain on any buying or selling of the currency as follows.

A trading company has imported goods for which it must now pay US$10,000.

(a) The company will ask a bank to sell it US$10,000. If the company is buying currency, the bank is selling it.

(b) When the bank agrees to sell US$10,000 to the company, it will tell the company what the spot rate of exchange will be for the transaction. If the bank's selling rate (known as the **'offer'**, or **'ask'** price) is, say $1.7935 for the currency, the bank will charge the company:

$$\frac{\$10,000}{\$1.7935 \text{ per Tk } 1} = \text{Tk } 5,575.69$$

Similarly, if an exporter is paid, say, US$10,000 by a customer in the USA, he will ask his bank to buy the dollars from him. Since the exporter is selling currency to the bank, the bank is buying the currency.

If the bank quotes a buying rate (known as the **bid** price) of, say $1.8075, for the currency the bank will pay the exporter:

$$\frac{\$10,000}{\$1.8075 \text{ per Tk } 1} = \text{Tk } 5,532.50$$

A bank expects to make a profit from selling and buying currency, and it does so by offering a rate for selling a currency which is different from the rate for buying the currency.

Interactive question 1: Exchange rates [Difficulty level: Intermediate]

Calculate how much Taka exporters would receive or how much Taka importers would pay, ignoring the bank's commission, in each of the following situations, if they were to exchange the overseas currency and Taka at the spot rate.

(a) A Bangladeshi exporter receives a payment from a Danish customer of 150,000 kroners.
(b) A Bangladeshi importer buys goods from a Japanese supplier and pays 1 million yen.

Spot rates are as follows.

	Bank sells (offer)		*Bank buys (bid)*
Danish Kr/Tk	9.4340	–	9.5380
Japan ¥/Tk	203.650	–	205.781

See **Answer** at the end of this chapter.

1.2 Direct and indirect currency quotes

A **direct quote** is the amount of domestic currency which is equal to one foreign currency unit.

An **indirect quote** is the amount of foreign currency which is equal to one domestic currency unit.

In Bangladesh indirect quotes are invariably used but, in most countries, direct quotes are more common.

Currencies may be quoted in either direction. For example, the US dollar and euro might be quoted as €/$ = 0.7745 or $/€ = 1.2912. In other words 0.7745€ = $1 and 1.2912$ = €1. One rate is simply the reciprocal of the other.

2 Risk and foreign exchange

Section overview

- Currency movements create different types of risk – economic, translation and transaction risk.
- Direct risk reduction methods are based on matching receipts and payments on assets and liabilities.

2.1 Currency risk

The following different types of currency risk may be distinguished.

Definitions

Transaction risk: this is the risk of adverse exchange rate movements occurring in the course of **normal international trading transactions**.

This arises when the prices of imports or exports are fixed in foreign currency terms and there is movement in the exchange rate between the date when the price is agreed and the date when the cash is paid or received in settlement.

Translation risk: this is the risk that the organisation will make exchange losses when the accounting results of its foreign branches or subsidiaries are translated into the home currency.

Translation losses can result, for example, from restating the book value of a foreign subsidiary's assets at the exchange rate at the balance sheet date.

Economic risk: this refers to the effect of exchange rate movements on the **international competitiveness** of a company.

For example, a Bangladeshi company might use raw materials which are priced in US dollars, but export its products mainly within the local region. Both a depreciation of Taka against the dollar or an appreciation of Taka against other local currencies will erode the competitiveness of the company. Economic exposure can be difficult to avoid, although **diversification of the supplier and customer base** across different countries will reduce this kind of exposure to risk.

2.2 Managing transaction exposure

We shall now look at the various means by which a business can manage its exposure to exchange rate risk. We are principally concerned here with the risk that has a direct effect on immediate cash flows – transaction risk. This risk is illustrated in the following question.

Worked example: Changes in exchange rates

Bulldog Ltd, a Bangladeshi company, buys goods from Redland which cost 100,000 Reds (the local currency). The goods are re-sold in Bangladesh for Tk32,000. At the time of the import purchase the exchange rate for Reds against Taka is 3.5650 – 3.5800.

Requirement

What is the expected profit on the re-sale?

Solution

Bulldog must buy Reds to pay the supplier, and so the bank is selling Reds. The expected profit is as follows.

	Tk
Revenue from re-sale of goods	32,000.00
Less cost of 100,000 Reds in Taka (÷ 3.5650)	28,050.49
Expected profit	3,949.51

Interactive question 2: Transaction risk

[Difficulty level: Intermediate]

Calculate the actual profit earned by Bulldog Ltd in the above example if the spot rate at the time when the currency is received has moved to:

(a) 3.0800 – 3.0950
(b) 4.0650 – 4.0800

Ignore bank commission charges.

See **Answer** at the end of this chapter.

2.3 Should we hedge?

While the idea of reduced risk may sound appealing, it is of course possible to do nothing ie leave the business open to changes in the foreign exchange rate. There are a number of factors to consider before getting involved in hedging activities.

Costs	Using hedges often means incurring costs. Many hedges require use of a third party, such as a bank or an exchange, which means transaction costs of various types.
Exposure	The extent of the risk faced – for example, if the amount is not material in the context of the firm's business then incurring the costs of hedging the risk may not be worthwhile.
Attitude to risk	A firm may benefit from exchange rates moving in a favourable direction. Many of the hedges explained in this chapter simply fix the exchange rate, thus removing any upside potential as well as downside risk.
Portfolio effect	For many international businesses, the nature of the trade may be such that they trade with many different countries, in a wide range of currencies. In such circumstances the overall effect of different currency movements needs to be assessed, as the strengthening in some may be cancelled by a weakening in others.
Shareholders	If shareholders are fully diversified, it can be argued that this should take account of the

	strengthening – and consequent weakening – of individual currencies. A currency can only strengthen relative to another, and therefore an increase in the value of an asset in one currency can only happen if there is a decrease in the value of an asset held in another currency. If such a situation exists, there is no benefit to hedging, as fully diversified investors' exposure to systematic risk will not be affected. That being said, the above comments regarding diversified shareholders only apply in a perfect capital market and many investors are not fully diversified internationally. In practice managers will know the actual exposure of a firm in a way that shareholders will not, and therefore the shareholders may well benefit from a firm's hedging activities.
Insolvency risk and cost of capital	Following on from the above, because hedging does reduce the volatility of a business' cashflows and thus the risk of insolvency, there should be a reduction in the cost of capital to reflect this.

While there are many factors to consider before hedging currency risk, it needs to be put into context – if the risk derives from an import or export trade, given the many additional trading risks that are a feature of this (see section 6.5 below), the presence of currency risks on top of this is generally fairly unwelcome. Combined with the fact that simple hedges such as forward contracts are not that expensive, many companies do make use of hedges.

2.4 Direct risk reduction methods

The **forward exchange contract** is perhaps the most important method of obtaining cover against risks, where a firm decides that it does not wish to speculate on foreign exchange movements. This is discussed later in section 3 of this chapter. However, there are **other methods of reducing risk** which we shall consider first.

2.5 Invoice currency

One way of avoiding exchange risk is for an exporter to invoice his foreign customer in his domestic currency, or for an importer to arrange with his foreign supplier to be invoiced in his domestic currency.

However, although either the exporter or the importer can avoid any exchange risk in this way, only one of them can deal in his domestic currency. The other must accept the exchange risk, since there will be a period of time elapsing between agreeing a contract and paying for the goods (unless payment is made with the order).

2.6 Matching receipts and payments

A company can reduce or eliminate its foreign exchange transaction exposure by **matching** (or netting off) receipts and payments. Wherever possible, a company that expects to make payments and have receipts in the same foreign currency should plan to **offset its payments against its receipts in the currency**.

Since the company will be setting off foreign currency receipts against foreign currency payments, it does not matter whether the currency strengthens or weakens against the company's 'domestic' currency because there will be no purchase or sale of the currency.

How to do this?

The process of matching is made simpler by having **foreign currency accounts** with a bank. Receipts of foreign currency can be credited to the account pending subsequent payments in the currency. (Alternatively, a company might invest its foreign currency income in the country of the currency – for example, it might have a bank deposit account abroad – and make payments with these overseas assets/deposits.)

Since a company is unlikely to have exactly the same amount of receipts in a currency as it makes payments, it will still be exposed to the extent of the net of income versus payments, and so the company may wish to avoid exposure on this difference by arranging **forward exchange cover**.

Why do this?

Offsetting (matching payments against receipts) will be **cheaper than arranging a forward contract** to buy currency and another forward contract to sell the currency, provided that receipts occur before payments, and the time difference between receipts and payments in the currency is not too long. Any material differences between the amounts receivable and the amounts payable in a given currency should be covered by a forward exchange contract to buy/sell the amount of the difference.

2.7 Matching assets and liabilities

A company which expects to receive a substantial amount of income in a foreign currency will be concerned that this currency may weaken. It can hedge against this possibility by borrowing in the foreign currency and using the foreign receipts to repay the loan.

For example, US dollar receivables can be hedged by taking out a US dollar overdraft. In the same way, US dollar trade payables can be matched against a US dollar bank account which is used to pay the creditors.

A company which has a long-term foreign investment, for example an overseas subsidiary, will similarly try to **match its foreign assets** (property, plant etc) by a **long-term loan in the foreign currency**.

2.8 Leads and lags

Companies might try to use:

- **Lead payments** (payments in advance)
- **Lagged payments** (delaying payments beyond their due date)

in order to take advantage of foreign exchange rate movements. With a lead payment, paying in advance of the due date, there is a finance cost to consider. This is the interest cost on the money used to make the payment, but early settlement discounts may be available.

It should be noted however that leading or lagging is effectively speculating on hoped for currency movements, which may not materialise.

3 Forwards and futures

Section overview

- Forward exchange contracts give a fixed exchange rate.
- Option forward exchange contracts allow for flexibility on when the contract is delivered.
- Forward contracts can be closed out rather than delivered.
- Forward exchange rates can be quoted as a premium or a discount to the spot rate.
- Interest rate differentials explain the difference between the spot and the forward rate.
- Futures are standardised forward contracts.

3.1 Forward exchange contracts

Forward exchange contracts hedge against transaction exposure by allowing the importer or exporter to arrange for a bank to sell or buy a quantity of foreign currency at a future date, at a **rate of exchange determined** when the **forward contract is made**. The trader will know in advance either how much local currency he will receive (if he is selling foreign currency to the bank) or how much local currency he must pay (if he is buying foreign currency from the bank).

Forward contracts are very popular with small companies. The current spot price is irrelevant to the outcome of a forward contract.

A **forward exchange contract** is:

- An immediately firm and binding contract, eg between a bank and its customer
- For the purchase or sale of a specified quantity of a stated foreign currency
- At a rate of exchange fixed at the time the contract is made
- For performance (delivery of the currency and payment for it) at a future time which is agreed when making the contract. (This future time will be either a specified date, or any time between two specified dates.)

Worked example: Forward exchange contract

A Bangladeshi importer knows on 1 April that he must pay a foreign seller 26,500 Swiss francs in one month's time, on 1 May. He can arrange a forward exchange contract with his bank on 1 April, whereby the bank undertakes to sell the importer 26,500 Swiss francs on 1 May, at a fixed rate of say 2.6400 to the Taka.

The Bangladeshi importer can be certain that whatever the spot rate is between Swiss francs and Taka on 1 May, he will have to pay on that date, at this forward rate:

$$\frac{26,500}{2.6400} = \text{Tk}10,037.88$$

(a) If the spot rate in one month is **lower than 2.6400**, the importer would have successfully protected himself against a weakening of Taka (strengthening of the Swiss franc), and would have avoided paying more Taka to obtain the Swiss francs.

(b) If the spot rate is **higher than 2.6400**, Taka's value against the Swiss franc would mean that the importer would pay more under the forward exchange contract than he would have had to pay if he had obtained the francs at the spot rate on 1 May. He cannot avoid this extra cost, because a forward contract is binding.

Summary

Thus the impact of a forward contract is to remove both upside potential **and** downside risk. It gives a fixed exchange rate.

3.2 Fulfilling a forward contract

3.2.1 What happens if a customer cannot satisfy a forward contract?

A customer might be unable to satisfy a forward contract for any one of a number of reasons.

- An **importer** might find that:
  - His supplier **fails to deliver the goods** as specified, so the importer will not accept the goods delivered and will not agree to pay for them
  - The **supplier sends fewer goods** than expected, perhaps because of supply shortages, and so the importer has less to pay for
  - The supplier is **late with the delivery**, and so the importer does not have to pay for the goods until later than expected
- An **exporter** might find the same types of situation, but in reverse, so that he does not receive any payment at all, or he receives more or less than originally expected, or he receives the expected amount, but only after some delay.

3.2.2 Close-out of forward contracts

If a customer cannot satisfy a forward exchange contract, the bank will make the customer fulfil the contract.

- If the customer has arranged for the bank to buy currency but the customer is unable to deliver the currency, the bank will:
  - **Sell currency** to the **customer** at the **spot rate** (when the contract falls due for performance)
  - **Buy** the **currency back**, under the terms of the **forward exchange contract**
- If the customer has contracted for the bank to sell him currency which the customer no longer needs, the bank will:
  - Sell the customer the specified amount of currency at the forward exchange rate
  - Buy back the unwanted currency at the spot rate

Thus, the bank arranges for the customer to perform his part of the forward exchange contract by either selling or buying the 'missing' currency at the spot rate. These arrangements are known as **closing out** a forward exchange contract.

3.3 Option forward exchange contracts

Option forward contracts are forward exchange contracts where the customer has the option to call for performance of the contract:

- At any date **from the contract** being made, up to a specified date in the future, or
- At any date **between two dates** both in the future

Performance must take place at some time: it cannot be avoided altogether.

Option forward contracts are normally used to cover whole months straddling the likely payment date, where the customer is not sure of the exact date on which he will want to buy or sell currency. (The purpose of an option forward contract is to avoid having to renew a forward exchange contract and extend it by a few days, because extending a forward contract can be expensive.)

Worked example: Option forward contract

A Bangladeshi company must pay $100,000 in approximately 1½ months' time and takes out an option forward exchange contract to eliminate the foreign currency transaction risk.

Exchange rate details are:

- Today's spot rate $1.9500 to the Tk
- One month forward rate $1.9475 to the Tk
- Two month forward rate $1.9450 to the Tk

Requirement

Explain how the foreign debt will be settled in 1½ months' time.

Solution

The bank will offer an option forward exchange contract to the company, allowing the company to choose when, between one month's time and two month's time, the currency is needed. The rate will be either the one month rate or the two month rate, which ever is more beneficial to the bank.

At one month rate cost = $100,000 ÷ 1.9475 = Tk51,348
At two month rate cost = $100,000 ÷ 1.9450 = Tk51,414

Therefore the rate chosen will be the two month rate, as that is more beneficial to the bank.

3.4 How are forward exchange rates set?

How are forward rates determined? The next section explores how and why forward rates are different from spot rates.

A forward rate might be higher or lower than the spot rate. For example, if the spot rate for dollars is $1.85/Tk, the forward rate could be:

Higher – $1.86 – the forward rate is said to be at **a discount** to the spot rate.
Lower – $1.83 – the forward rate is said to be at **a premium** to the spot rate.

3.5 The rule for adding or subtracting discounts and premiums

FORWARD RATES AS ADJUSTMENTS TO SPOT RATES	
Forward rate for the overseas currency is weaker than spot	Quoted at discount
Forward rate for the overseas currency is stronger than spot	Quoted at premium

A **discount** is therefore **added** to the spot rate, and a **premium** is **subtracted** from the spot rate. (The mnemonic **ADDIS** may help you to remember that we ADD Discounts and so subtract premiums.) The longer the duration of a forward contract, the larger will be the quoted premium or discount.

Worked example: Adjusting for a premium or discount

1 January: Spot rate US $ $1.9500 – 1.9610

one month forward discount:	0.20c	–	0.22c
three month forward premium:	0.22c	–	0.18c

Requirement

What are the forward rates quoted for one and three months contracts respectively?

Solution

The forward adjustments here are given in cents and need to be converted to dollars.

For example:	one month forward discount	0.20c	–	0.22c
	Equates to	$0.0020	–	$0.0022
Spot rate		$1.9500	–	$1.9610
one month forward		1.9520	–	1.9632

Obtained by adding the discount to the spot.

three month forward 1.9478 – 1.9592

Obtained by deducting the premium from the spot.

3.6 Interest rate parity

The principle of **interest rate parity** (IRP) links the currency and money markets and explains differences between the **forward and spot rates**.

The basic idea behind IRP is that if an investor places money in a currency with a high interest rate, they will be no better off after conversion back into their domestic currency using a forward contract than if they had simply left the money invested at the domestic interest rate.

Worked example: Interest rate parity

A treasurer has Tk1m available to place on deposit for 12 months.

- Spot rate is $1.5234/Tk
- Forward rate is $1.5407/Tk
- Annual Bangladesh rate of interest is 6%
- Annual US rate of interest is 7.2%

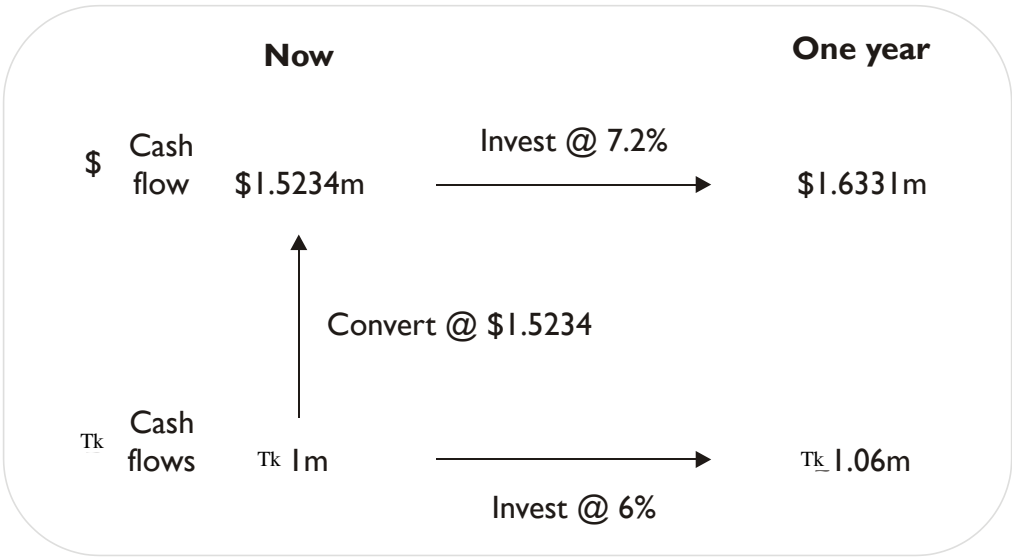
Requirements

(a) What would happen if the Tk1m was deposited in either Bangladesh or the US?
(b) What is the implication of this for the forward exchange rate?

Solution

(a) The treasurer could convert the Tk1m into dollars, and put it on deposit in the US at 7.2%.

After a year, the dollar amount would be converted back to Taka:



The two alternative investments would give $1.6331m and Tk1.06m respectively.

Which of these is preferable depends on the exchange rate in one year. If the exchange rate stays at $1.5234, then the US deposit converts into

($1.6331m @ $1.5234/Tk) = Tk1.072m

ie a 7.2% return instead of a 6% return.

(b) Interest rate parity predicts that there will be no benefit after the impact of the exchange rate is taken into account.

Thus the forward rate of exchange predicted by IRP is $1.6331/Tk1.06 = $1.5407/Tk.

If the forward rate were not set at $1.5407/Tk, a disequilibrium position is created. For example, if the forward rate were set equal to the spot rate of $1.5234, the implications are that investors would be keen to sell dollars in the forward market and buy Taka. These forces of supply and demand would cause dollars to weaken and Taka to strengthen, and thus the forward rate would change.

Note that is what the example has shown; a forward rate of $1.5407 is a weaker dollar rate than the spot rate of $1.5234.

The process by which the relationship between spot and forward rates is maintained through buying and selling of the currency is known as arbitrage.

3.7 Use of interest rate parity to forecast future exchange rates

The relationship between the spot and forward rates is shown algebraically as follows:

$$\text{Spot rate} \times \frac{1+i_f}{1+i_{uk\,BD}} = \text{Forward rate}$$

Where i_f is the overseas interest rate
I_{BD} is the domestic interest rate

and where the spot and forward rates are quoted as indirect quotes.

The **interest rate parity** formula links the forward exchange rate with interest rates in a fairly exact relationship, because risk-free gains are possible if the rates are out of alignment. The forward rate tends to be an unbiased predictor of the future exchange rate. So does this mean that future exchange rates can be predicted using interest rate parity?

The simple answer is 'yes', but of course the prediction is subject to very large inaccuracies, because events which arise in the future can cause large currency swings in the opposite direction to that predicted by interest rate parity.

Interactive question 3: Interest rate parity [Difficulty level: Easy]

A Bangladeshi company is expecting to receive $1 million in one year's time. The spot rate is $1.95/Tk. The company could borrow in dollars at 6% or in Taka at 5%. Predict what the exchange rate is likely to be in one year.

See **Answer** at the end of this chapter.

3.8 Purchasing power parity (PPP)

Definition

Purchasing power parity: the theory that in the long term exchange rates between currencies will tend to reflect the relative purchasing power of each country.

This theory is based on the idea that a basket of goods in one country will – after the effect of the exchange rate – cost the same no matter where it is traded. It is sometimes **called the law of one price**.

Worked example: Purchasing power parity

Consider a collection of goods that sell for Tk1,000 in Bangladesh.

If the exchange rate is $1.80/Tk, what are the implications of the same goods selling for $2,000 in the US?

Solution

In principle, if the same goods cost $2,000 in the US, instead of (Tk1,000 @ $1.80) = $1,800, then consumers would buy from Bangladesh (requiring Tk) and not in the US (therefore selling $).

These forces of supply and demand would ultimately cause the exchange rate to alter with dollars weakening to $2.00/Tk, at which point the prices are effectively the same.

Different inflation rates

The impact of different inflation rates will cause prices to change at different speeds. So even if parity has been achieved (as above) a disequilibrium will be created.

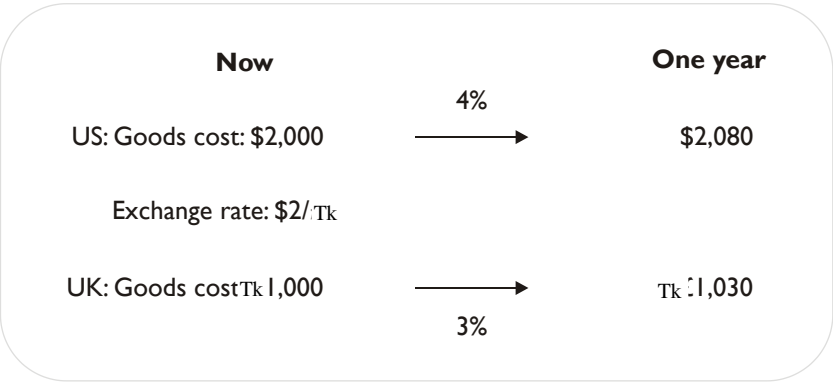
Purchasing power parity predicts that the disequilibrium will be removed by exchange rates changing.

Worked example: Different inflation rates

Taking the situation above, ie where an equilibrium rate of $2/Tk exists, show what would happen if

- Expected inflation in Bangladesh is 3%
- Expected inflation in the US is 4%

Solution



A disequilibrium is created in one year which is then removed by the exchange rate altering.

The new equilibrium exchange rate would be $2,080/Tk1,030 =$2.0194/Tk

Note: This is the application of the same relationship as set out above:

$$\text{Spot rate} \times \frac{1+i_f}{1+i_{ukBD}} = \text{Forward rate}$$

$$\$2/Tk \times \frac{1.04}{1.03} = \$2.0194$$

3.9 Currency futures

Definition

Currency futures: A currency future is a contract to buy or sell a standardised amount of a currency for notional delivery at a set date in the future.

As was introduced in Chapter 9, these are standardised forward contracts, but differ in some significant regards. For example, the Chicago Mercantile Exchange (CME) trades Sterling futures contracts with a standard size of £62,500. Only whole number multiples of this amount can be bought or sold.

As with interest rate futures, they can only be delivered on certain dates eg Sterling futures have contract dates of March, June, September or December.

Whilst futures achieve a similar outcome to forward contracts, being a fixed rate of exchange, the mechanics are different.

Worked example: Currency futures

A US exporter is expected to receive £250,000 in December.

It is currently August.

- The spot rate now is: $1.85/£
- The quote for December futures is: $1.85/£.

The US exporter uses futures to hedge its currency risk. Contract size is £62,500.

In December, the company receives £250,000

- The spot rate in December moved to $1.90
- The futures rate in December was also $1.90

Show the outcome of a futures hedge.

Solution

Number of contracts = £250,000 ÷ £62,500 = 4 contracts

Exporter needs to *sell* futures (sell £ s)

In August – the hedge is set up by

Selling (4 contracts × £62,500) = £250,000 for December delivery at $1.85

In December – the futures position is closed

Buying (4 contracts × £62,500) = £250,000 for December at delivery $1.90

Summary of futures position

	$
Sell £ for	1.85
Buy £ for	(1.90)
Loss per £	(0.05)

$0.05/£ × (£62,500 × 4 contracts) = $12,500

The £250,000 received by the US exporter is then sold in December at the prevailing spot rate

£250,000 @ $1.90 = $475,000

Notice that Sterling strengthened in the spot rate over the period, causing an increase in the value of the Sterling as follows:

$

Value of £250,000 – in August @ 1.85	462,500
Value of £250,000 – in December @ 1.90	475,000
Increase in value	12,500

Summary

	$
Increase in value of Sterling remittance:	12,500
Loss due to futures position	12,500

Thus the futures hedges remove risk – both upside potential (as above) and downside risk.

The above simplified example shows a perfect hedge. *In reality this is unlikely to happen*, due to basis risk and the standardised nature of futures contracts.

3.10 Choosing between forward contracts and futures contracts

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.

Advantages of futures over forward contracts

- **Transaction** costs should be **lower**.
- 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.

Disadvantages of futures compared with forward contracts

- The **contracts cannot be tailored** to the user's exact requirements.
- **Hedge inefficiencies** are **caused** by having to deal in a whole number of contracts and by basis risk ie pricing differences between spot markets and futures markets.
- **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).
- The **procedure for converting** between two currencies neither of which is the US dollar is more complex for futures compared to a forward contract.

In general, the disadvantages of futures mean that the market is much smaller than the currency forward market.

4 Hedging using the money markets

Section overview

- A money market hedge achieves the same end as a forward contract.
- A money market hedge matches assets and liabilities in the same currency.
- The choice of hedge is determined by which is cheapest.

4.1 Money market hedges

Because of the close relationship between forward exchange rates and the interest rates in the two currencies, it is possible to 'manufacture' a forward rate by using the spot exchange rate and money market lending or borrowing. This technique is known as a money market hedge or synthetic forward.

4.2 Setting up a money market hedge for a foreign currency payment

Suppose a Bangladeshi company needs to pay a Swiss creditor in Swiss francs in three months' time. It does not have enough cash to pay now, but will have sufficient in three months' time. Instead of negotiating a forward contract, the company could:

Step 1

Borrow the appropriate amount in Taka now

Step 2

Convert the Taka to francs immediately

Step 3

Put the francs on deposit in a Swiss franc bank account

Step 4

When the time comes to pay the company:

(a) Pays the creditor out of the franc bank account

(b) Repays the pound loan account

The effect is exactly the same as using a forward contract, and will usually cost almost exactly the same amount. If the results from a money market hedge were very different from a forward hedge, speculators could make money without taking a risk. Therefore market forces ensure that the two hedges produce very similar results.

Worked example: Money market hedge

A Bangladeshi company owes a Danish creditor Kr 3,500,000 in three months' time. The spot exchange rate is Kr/Tk 7.5509 – 7.5548. The company can borrow in Taka for three months at 8.60% per annum and can deposit kroners for three months at 10% per annum. What is the cost in Taka with a money market hedge and what effective forward rate would this represent?

Solution

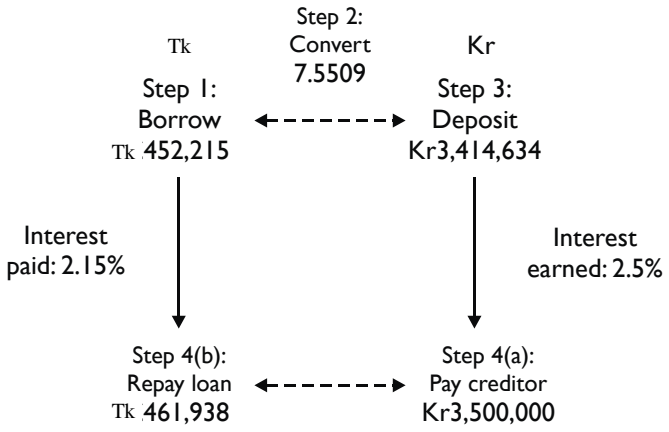
The interest rates for three months are 2.15% to borrow in Taka and 2.5% to deposit in kroners. The company needs to deposit enough kroners now so that the total including interest will be Kr3,500,000 in three months' time. This means depositing:

Kr3,500,000/(1 + 0.025) = Kr3,414,634.

These kroners will cost Tk452,215 (spot rate 7.5509). The company must borrow this amount and, with three months' interest of 2.15%, will have to repay:

Tk452,215 × (1 + 0.0215) = Tk461,938.

Thus, in three months, the Danish creditor will be paid out of the Danish bank account and the company will be paying Tk461,938 to satisfy this debt. The effective forward rate which the company has 'manufactured' is 3,500,000/461,938 = 7.5768. This effective forward rate shows the kroner at a discount to the Taka because the kroner interest rate is higher than the Taka rate.



4.3 Setting up a money market hedge for a foreign currency receipt

A similar technique can be used to cover a foreign currency receipt from a debtor. To manufacture a forward exchange rate, follow the steps below.

Step 1

Borrow an appropriate amount in the foreign currency today

Step 2

Convert it immediately to home currency

Step 3

Place it on deposit in the home currency

Step 4

When the debtor's cash is received:

(a) Repay the foreign currency loan

(b) Take the cash from the home currency deposit account

Interactive question 4: Money market hedge

[Difficulty level: Intermediate]

A Bangladeshi company is owed SFr 2,500,000 to be paid in three months' time by a Swiss company. The spot exchange rate is SFr/Tk 2.2498 – 2.2510. The company can deposit in Taka for three months at 8.00% per annum and can borrow Swiss Francs for three months at 7.00% per annum. What is the receipt in Taka with a money market hedge and what effective forward rate would this represent?

Solution

See **Answer** at the end of this chapter.

4.4 Choosing the hedging method

When a company expects to receive or pay a sum of foreign currency in the next few months, it can choose between using the forward exchange market and the money market to hedge against the foreign exchange risk. Other methods may also be possible, such as making lead payments. The cheapest method available is the one that ought to be chosen.

Interactive question 5: Choosing the cheapest method

[Difficulty level: Exam standard]

Trumpton Ltd has bought goods from a US supplier, and must pay $4,000,000 in three months' time. The company's finance director wishes to hedge against the foreign exchange risk, and the three methods which the company usually considers are:

- Using forward exchange contracts
- Using money market borrowing or lending
- Making lead payments

The following annual interest rates and exchange rates are currently available.

	US dollar		Taka	
	Deposit rate	Borrowing rate	Deposit rate	Borrowing rate
	%	%	%	%
1 month	7	10.25	10.75	14.00
3 months	7	10.75	11.00	14.25

	$/Tk exchange rate ($ = Tk1)
Spot	1.8625 – 1.8635
1 month forward	0.60c – 0.58c pm
3 months forward	1.80c – 1.75c pm

Which is the cheapest method for Trumpton Ltd?

Forward Contract

Money Market hedge

Lead payment

See **Answer** at the end of this chapter.

4.5 Comparison of hedging methods

	Forward	Money Market	Futures
Tailored	✓	✓	✗
Secondary market to 'unwind' hedge	✗	✓	✓
Transaction cost	Via spread	Via spreads on interest and spot rate	Brokerage fees
Complexity	Low	Medium	High
Management costs	Low	Medium	High
Volume/popularity	Small/medium companies	Banks	Growing especially for companies with high exposure

5 Currency options

Section overview

- Options remove downside risk but leave upside potential.
- A premium must be paid.
- Options are used in situations where there is uncertainty over the future outcomes.

5.1 Introduction

Currency options protect against adverse movements in the exchange rate while allowing the investor to take advantage of favourable exchange rate movements.

One shortcoming of forwards, futures and money market hedges is that a binding contract to buy or sell currency is being entered into. This can be problematic in situations where the cash flow is not certain to occur eg when tendering for overseas contracts. Currency options are particularly useful in this type of situation.

Definition

A **currency option** is an agreement involving a right, but not an obligation, to buy or to sell a certain amount of currency at a stated rate of exchange (the **exercise price**) at some time in the future.

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. **Selling** (or 'writing') options, unless covered by other transactions, is risky because the seller ('writer') bears the whole of the cost of the variation and can face potentially unlimited losses. Such risks received much publicity with the Barings Bank failure in 1995.

5.2 Currency option terminology

Some terminology relating to traded options was explained in the previous chapter in the context of options to buy and sell shares. Much of the same terminology applies to currency options.

5.3 Currency option quotations

A company wishing to purchase an option to buy or sell Sterling might use over the counter currency options from its bank or those traded on the important Philadelphia Stock Exchange. The schedule of prices for £/$ options is set out in tables such as the one shown below.

Philadelphia SE £/$ options £31,250 (cents per pound)

	Calls			Puts		
Strike price	Aug	Sep	Oct	Aug	Sep	Oct
1.5750	2.58	3.13	–	–	0.67	–
1.5800	2.14	2.77	3.24	–	0.81	1.32
1.5900	1.23	2.17	2.64	0.05	1.06	1.71
1.6000	0.50	1.61	2.16	0.32	1.50	2.18
1.6100	0.15	1.16	1.71	0.93	2.05	2.69
1.6200	–	0.81	1.33	1.79	2.65	3.30

Note the following points.

(a) The contract size is £31,250.

(b) If a firm wished to have the **option to buy pounds** (selling dollars) in September, it can buy a **call option on Sterling**. To have the option to buy pounds at an exchange rate of $1.5800/£, it would need to pay a premium of 2.77 cents per pound. For a higher exchange rate, the premium is lower, since the higher exchange rate is less favourable to the buyer of the option: more dollars are needed to buy the same number of pounds.

(c) A **put option** here is the **option to sell Sterling** in exchange for dollars. Note that a put option with a strike price of 1.6000 $/£ exercisable in September is, at 1.50 cents per pound, cheaper than a September put option exercisable at 1.6100 $/£, which is available at a premium of 2.05 cents per pound. The premium on put options is higher for the higher exchange rate since the purchaser will receive more dollars for each pound sold than with the lower exchange rate.

(d) Note that a call option with a strike price of 1.6000 $/£ exercisable in September will **cost more** than an option with the same strike price which is exercisable in August. This difference reflects the fact that for the September option there is a **longer period** until the exercise date and consequently the likelihood of it being beneficial to exercise the option is increased (ie it is more likely to be 'in the money' at the exercise date). The

difference also reflects the market's view of the direction in which the exchange rate is likely to move between the two dates.

5.4 Using currency options

The main purpose of currency options is to **reduce exposure** to **adverse currency movements**, while allowing the holder to profit from favourable currency movements. They are particularly useful for companies in the following situations:

- Where there is **uncertainty** about **foreign currency receipts** or **payments**, either in timing or amount. Should the foreign exchange transaction not materialise, the option can be sold on the market (if it has any value) or exercised if this would make a profit.

- To allow the publication of price lists for its goods in a foreign currency. In this situation, the company would not know whether it had won any export sales or would have any foreign currency income at the time that it announces its selling prices. It cannot make a forward exchange contract to sell foreign currency without becoming exposed in the currency.

- To protect the import or export of price-sensitive goods. If there is a favourable movement in exchange rates, options allow the importer/exporter to profit from the favourable change (unlike forward exchange contracts, when the importer/exporter is tied to a fixed rate of exchange by the binding contract). This means that the gains can be passed on in the prices to the importer's or exporter's customers.

5.5 Comparison of currency options with forward contracts and futures contracts

Earlier in this chapter, we saw that a hedge using a currency future will produce approximately the same result as a currency forward contract, subject to hedge inefficiencies. When comparing currency options with forward or futures contracts we usually find the following.

- If the currency movement is adverse, the option will be exercised, but the hedge will not normally be quite as good as that of the forward or futures contract; this is because of the **premium cost of the option**.

- If the currency movement is favourable, the option will not be exercised, and the result will normally be better than that of the forward or futures contract; this is because the option allows the holder to **profit from the improved exchange rate**.

These points are illustrated by the next series of examples.

Worked example: Over-the-counter currency options

Sugar Ltd is expecting to receive 20 million South African rands (R) in one month's time. The current spot rate is R/Tk 19.3383 – 19.3582. Compare the results of the following actions.

(a) The receipt is hedged using a forward contract at the rate 19.3048.

(b) The receipt is hedged by buying an over-the-counter (OTC) option from the bank, exercise price R/Tk 19.30, premium cost of Tk24,000.

(c) The receipt is not hedged.

In each case compute the results if, in one month, the exchange rate moves to:

(a) R 21.00/Tk

(b) R 17.60/Tk

Solution

The target receipt at today's spot rate is 20,000,000/19.3582 = Tk1,033,154.

(a) The receipt using a forward contract is fixed with certainty at 20,000,000/19.3048 = Tk1,036,012.

This applies to both exchange rate scenarios.

(b) The cost of the option is Tk24,000. This must be paid at the start of the contract.

The results under the two scenarios are as follows.

Scenario	(a)	(b)
Amount received at exchange rate	R 20 million @ R21.0/Tk = Tk952,381	@17.60 = Tk1,136,364
Amount received at exercise price	R 20 million @ R19.30/Tk = Tk1,036,269	@ 19.30 = Tk1,036,269
Does the company exercise the option?	YES	NO

	(a)	(b)
	Tk	Tk
Taka received	1,036,269	1,136,364
Less option premium	(24,000)	(24,000)
Net receipt	1,012,269	1,112,364

(c) The results of not hedging under the two scenarios are as follows.

Scenario	(a)	(b)
Exchange rate	21.00	17.60
Taka received	Tk952,381	Tk1,136,364

Summary. The option gives a result between that of the forward contract and no hedge.

- If the South African rand weakens to 21.00, the best result would have been obtained using the forward market (Tk1,036,012).
- If it strengthens to 17.60, the best course of action would have been to take no hedge (Tk1,136,364).
- In both cases the option gives the second best result, being Tk24,000 below the best because of its premium cost.

Worked example: Traded currency options

Prices (premiums) on 1 June for Sterling traded currency options on the Philadelphia Stock Exchange are shown in the following table.

Sterling £31,250 contracts (cents per £)

Exercise price	*Calls*		*Puts*	
$/£	*September*	*December*	*September*	*December*
1.5000	5.55	7.95	0.42	1.95
1.5500	2.75	3.85	4.15	6.30
1.6000	0.25	1.00	9.40	11.20

Prices are quoted in cents per £.

On 1 June, the current spot exchange rate is $1.5404 – $1.5425 and September futures are quoted at $1.54 with a standard contract size of £62,500.

Stark Inc, a US company, is due to receive £3.75 million from a debtor in four months' time at the end of September. The treasurer decides to hedge this receipt using either September £ traded options or September futures.

Requirement

Compare the results of using an option to hedge with a futures contract.

Illustrate the results with an option exercise price of $1.55 if by the end of September the spot exchange rate moves to (i) $1.4800; (ii) $1.5700.

Assume that at the end of September the quote for September futures is the same as the spot exchange rate.

Solution

The target receipt is 3,750,000 × 1.5404* = $5,776,500.

*The American company gets the lower number of dollars for selling Sterling.

A receipt of £3.75 million will require £3,750,000/£31,250 = 120 option contracts.

Using options, the treasurer will purchase 120 September *put* options (ie needs to sell £ as the underlying option is in £ s). The premium cost will vary with the exercise price as follows.

Exercise price	Cost £
1.5000	120 × 0.42/100 × 31,250 = $15,750
1.5500	120 × 4.15/100 × 31,250 = $155,625
1.6000	120 × 9.40/100 × 31,250 = $352,500

Assuming an exercise price of 1.55 is chosen, the cost of the premium on 1 June is $155,625.

Impact of options

Scenario	(i)	(ii)
Prevailing exchange rate ($/£) in September	1.48	1.57
Have right to sell Sterling for	1.55	1.55
Intrinsic value of option ($ per £)	0.07	Zero
Exercise?	Yes	No
Value of options: $0.07 × £31,250	= $2,187.50 per contract	
No. of contracts	120	
Gain on option	$262,500	
Value of Sterling receipt at prevailing exchange rate (£3.75m)	$5,550,000	$5,887,500
Gain on option	$262,500	
Less: premium	$(155,625)	$(155,625)
	$5,656,875	$5,731,875

Impact of futures

The company will want to sell $\frac{£3.75\,\text{million}}{£62,500}$ = 60 contracts.

The hedge position will be to sell the September futures at $1.54 on 1 June, and then close out at the end of September.

Scenario	(i)	(ii)
Closing futures price	(1.48)	(1.57)
Sold futures at	1.54	1.54
Gain/(loss) on future	$0.06/£	$(0.03)/£
	× £62,500	× £62,500
	× 60 contracts	× 60 contracts
Overall futures position =	$225,000	$(112,500)
Value of Sterling receipt at prevailing exchange rate (£3.75m)	$5,550,000	$5,887,500
	$5,775,000	$5,775,000

The effect of the future is to give a fixed exchange rate. This is slightly different from the target receipt because of basis risk.

Summary

The future gives a fixed exchange rate whereas the option removes the downside risk leaving the upside potential. Unfortunately, the option premium is so expensive that the receipt under the future is more attractive. This does depend of course, on which option is chosen and what the closing exchange rate turns out to be.

5.6 The drawbacks of currency options

The major drawbacks of currency options are as follows.

- The **cost is about 5%** of the **total amount** of **foreign exchange covered**, although the exact amount depends on the expected volatility of the exchange rate and the particular option chosen.
- **Options** must be **paid for as soon as they are bought**.
- **Tailor-made options lack negotiability**.
- Traded options are **not available** in every currency.

6 Hedging economic and translation exposure

Section overview

- Economic exposure can be hedged by matching assets and liabilities and diversification.
- Translation exposure, the risk of apparent losses appearing when accounting results are translated, probably does not need to be hedged.

6.1 Economic exposure

Definition

Economic exposure: is the risk that longer-term 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.

Overseas subsidiary:

Suppose a Bangladeshi company invests in setting up a subsidiary in Eastern Europe. The currency of the Eastern European country depreciates continuously over a five year period. The cash flows remitted back to Bangladesh are worth less in Taka terms each year, causing a reduction in the value of the investment project.

Importer-exporter:

Another Bangladeshi company buys raw materials that are priced in US dollars. It converts these materials into finished products that it exports mainly to Spain. Over a period of several years, the pound depreciates against the dollar but strengthens against the euro. The Taka value of the company's income declines while the Taka cost of its materials increases, resulting in a drop in the value of the company's cash flows.

The value of a company depends on the present value of its expected future cash flows. If there are fears that a company is exposed to the sort of exchange rate movements described above, this may reduce the company's value. Protecting against economic exposure is therefore necessary to protect the company's share price.

Domestic producers:

A company need not even engage in any foreign activities to be subject to economic exposure. For example, if a company trades only in Bangladesh but Taka strengthens appreciably against other world currencies, it may find that it loses Bangladesh sales to a foreign competitor who can now afford to charge cheaper Taka prices.

6.2 Economic exposure and inflation

None of these examples are as simple as they seem, however, because of the compensating actions of economic forces. For example, if the exchange rate of an Eastern European country depreciates significantly, it is probably because of its high inflation rate.

So if the Eastern European subsidiary of a Bangladeshi company increases its prices in line with inflation, its cash flows in the local currency will increase each year. However under **purchasing power parity** the currency will depreciate. The cash flows will therefore be converted at the depreciating exchange rate to produce a fairly constant Taka value of cash flows. Alternatively, if the subsidiary does not increase its prices, it may increase its sales volume by selling at more competitive prices.

Worked example: Economic forces

A Bangladeshi company has an overseas US subsidiary which remits all $ cashflows back to the Bangladesh.

Consider a situation in which inflation rates in the US are higher than in Bangladesh eg 5% and 3% respectively.

Assuming a spot rate of $1.80/Tk illustrate what would happen if the

(a) US subsidiary did not increase prices in year 1

(b) US subsidiary increased prices by inflation in year 2.

Solution

		Year 1		Year 2	
$ cash flow	100		100		105
Exchange rate	$1.80	$\times \frac{1.05}{1.03} =$	$1.83	$\times \frac{1.05}{1.03} =$	$1.87
Tk cash flows	55.56		54.50		56.13

Economic exposure is illustrated in year 1. The effect of higher US inflation causes the dollar to weaken and therefore Taka remittances fall.

In year 2, the increase in the US prices of 5% more than compensates for the decline in the currency (being approximately 2%) resulting in the Taka remittance going up by 3% (the Bangladesh rate of inflation).

Thus the effects of economic exposure may be reduced by changes in prices, which mean the real exchange rate changes little if at all. However there may be timing differences involved and if exchange rate movements are very large, the business might suffer for a while before compensating economic forces take effect.

6.3 Hedging economic exposure

It can be difficult to hedge against economic exposure in the short term; only in the longer term, where sales prices and resource costs can change, and strategy developed, can steps be taken.

- **Diversifying operations world-wide**
  On the principle that companies which confine themselves to one country suffer from economic exposure, international diversification is a method of reducing risk. Companies may look to diversify any or all of sales, production, raw material supplies and finance sources across different countries.
- **Market and promotional management**

  Having taken the decision to diversify, the company must then carefully decide in which markets to operate. This decision will link in with strategic objectives, and weigh the economic exposure against the earnings that the market is reckoned to be able to generate.
- **Product management**

  High levels of economic exposure may mean high-risk product decisions, particularly the decision to launch new products, are not taken.
- **Pricing**

  Again pricing strategy must respond to the risk of fluctuations in exchange rates, but this must also tie in with other objectives; reducing prices may maintain market share but may result in a reduction in distributable profits. Changing prices to combat exchange rate movements may also cause complications in the company's own local markets, particularly if competitors respond.
- **Production management**

  As indicated above, levels of economic exposure may influence supply and location of production decisions. Complications can arise when changing the mix of inputs; this may reduce economic exposure but there may be costs involved in becoming more flexible. However, it will be much easier to shift production to countries with falling exchange rates and lower relative production costs if the company already has facilities in these places and it is feasible to shift production to them.

6.4 Translation exposure

Definition

Translation exposure: is the risk that the organisation will make **exchange losses** when the **accounting results** of its foreign branches or subsidiaries are **translated** into the **home currency**.

Translation losses can result, for example, from restating the book value of a foreign subsidiary's assets at the exchange rate on the balance sheet date. Such losses will not have an impact on the firm's cash flow unless the assets are sold.

Does it matter?

There are opposing arguments as to whether translation exposure is important. The arguments centre on whether the reporting of a translation gain or loss will affect the company's share price. There is a powerful argument that, to the extent that cash flows are not affected, translation exposure can be ignored. On the other hand, those who believe that accounting results are an important determinant of share price argue that translation losses should be reduced to a minimum.

6.5 Overseas trade – trading risks

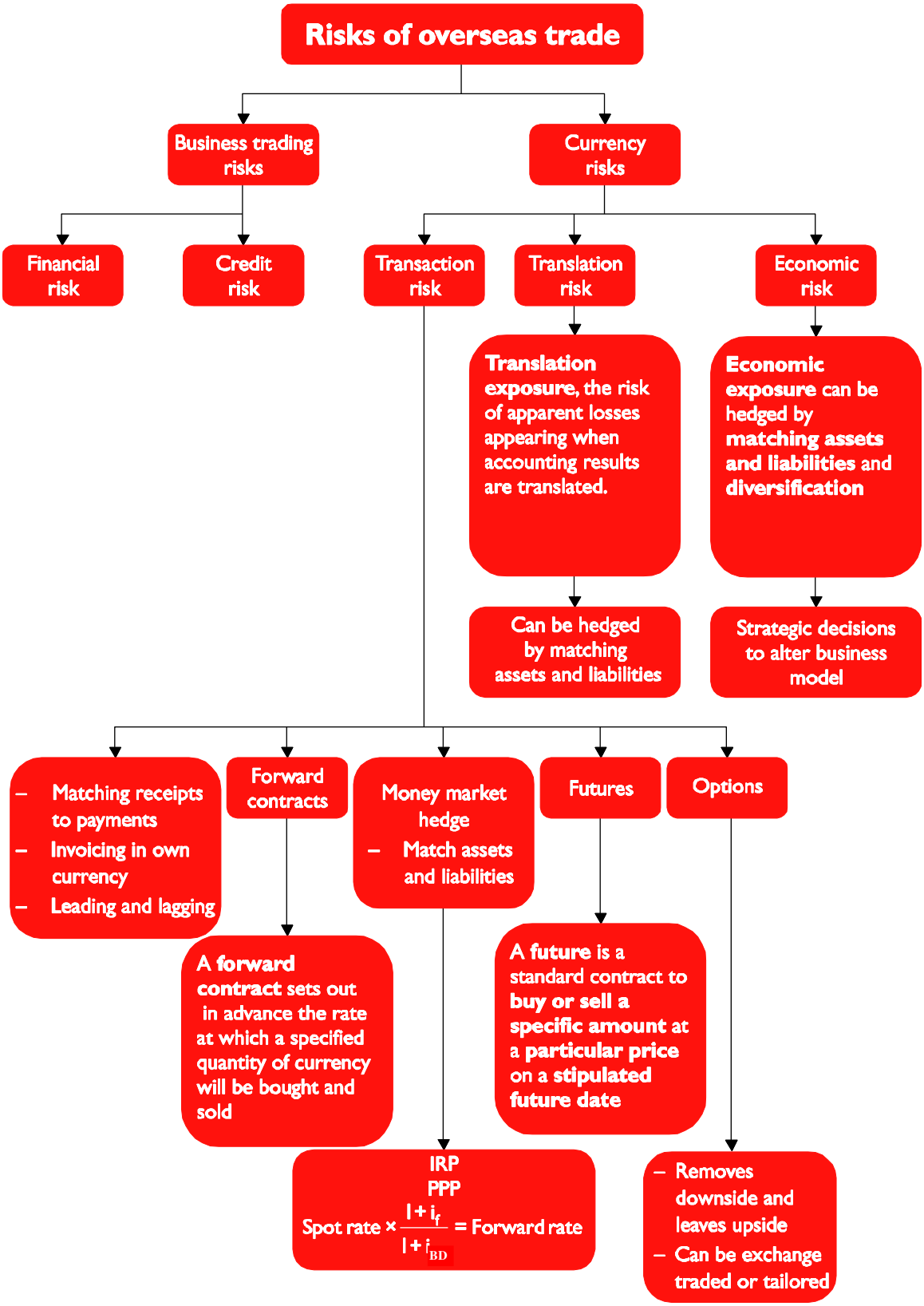
Both importers and exporters will face trading risks which are greater than those faced by domestic traders as a consequence of political and cultural risk as well as the increased distances and times involved. Types of trading risk include:

- **Physical risk** – the risk of goods being lost or stolen in transit, or the documents accompanying the goods going astray
- **Credit risk** – the possibility of payment default by the customer
- **Trade risk** – the risk of the customer refusing to accept the goods on delivery (due to sub-standard/inappropriate goods), or the cancellation of the order in transit
- **Liquidity risk** – the inability to finance the credit given to customers

Such risks may be reduced with the **help** of **banks, insurance companies, credit reference agencies** and **government agencies.**

Other ways to reduce these risks include risk **transfer**. A business shipping parcels overseas may agree a contract obligating the courier to pay for losses in excess of its statutory liability.

Summary


Risks of overseas trade
Business trading risks
Currency risks
Financial risk
Credit risk
Transaction risk
Translation risk
Economic risk
Translation exposure, the risk of apparent losses appearing when accounting results are translated.
Economic exposure can be hedged by matching assets and liabilities and diversification
Can be hedged by matching assets and liabilities
Strategic decisions to alter business model
– Matching receipts to payments
– Invoicing in own currency
– Leading and lagging
Forward contracts
Money market hedge
– Match assets and liabilities
Futures
Options
A forward contract sets out in advance the rate at which a specified quantity of currency will be bought and sold
A future is a standard contract to buy or sell a specific amount at a particular price on a stipulated future date
IRP
PPP
Spot rate × (1 + i_f) / (1 + i_BD) = Forward rate
– Removes downside and leaves upside
– Can be exchange traded or tailored

Self-test

Answer the following questions.

1 A Bangladeshi importer has signed an agreement to pay a Swiss exporting company SwFr 40,000 in three months' time.

Which of the following transactions can best eliminate the importer's exchange rate risk?

A Agree to buy SwFr for Taka in three months' time at the spot rate prevailing in three months

B Agree to sell SwFr for Taka in three months' time at today's three-month forward rate

C Borrow Taka now, convert to SwFr at today's spot rate, and invest in Switzerland

D Borrow SwFr now, convert to Taka at today's rate, and invest in Bangladesh.

2 A Bangladeshi company has despatched a shipment of goods to Sweden. The sale will be invoiced in Swedish Kroner and payment is to be made in three months' time. Neither the Bangladeshi exporter nor the Swedish importer uses the forward foreign exchange market to cover exchange risk.

If the Taka were to weaken substantially against the Swedish Kroner, what would be the foreign exchange gain or loss effects upon the Bangladeshi exporter and the Swedish importer?

3 A Bangladeshi company sells goods to a US customer and expects to receive payment of $400,000 in three months' time.

Which of the following will best hedge the company's exchange risk?

A Use the forward exchange market to sell $400,000 for Taka at the three-month forward rate

B Use the forward exchange market to buy $400,000 for Tk at the three-month forward rate

C Buy $400,000 now at the prevailing spot rate

D Sell $400,000 in three months' time at the prevailing spot rate

4 Which of the following is the best strategy for a Bangladeshi company which will receive US dollars in the future and desires to avoid exchange rate risk (assuming that the company has no off-setting purchase position in US dollars)?

A Purchase a put option on Taka

B Sell a put option on US dollars

C Buy a futures contract on Taka

D Obtain a forward contract to purchase US dollars forward

5 The following information relates to the Taka/euro spot and forward currency rates.

Spot	1.865 – 1.875
One month forward	0.02 – 0.015 euro premium

What would be the value in Taka of selling 10,000 euro one month forward?

6 A company invests Tk500,000 for one month in US dollar bonds. When the investment is made the treasurer will contract to convert the dollar investment back to Taka. The following data are available.

US dollar bond rate	1% per month
Bank buys US dollars	
Spot	$1.8731
One month premium	0.35 cents

Bank sells US dollars

Spot	$1.8711
One month premium	0.37 cents

How much Taka will be received in one month's time?

7 Simpleton sells goods to a US customer for $200,000, receivable in two months' time. Exchange rates are given below.

Spot	$1.7620 – 1.7680
Two months forward	0.40 – 0.35 cents pm

If Simpleton enters into a forward contract to sell $200,000 in two months' time, what will he receive?

8 If the current spot exchange price for euros against Taka is €1.5954 – 1.5974/Tk and if the one month forward rate is 1.5 - 0.5 cents premium (there are 100 cents in 1 euro), what would be the rate that would be agreed now for buying euros in one month's time?

9 The following are the currency rates for Taka spot and forward against the Buyland franc.

Spot	*Three months forward*
49.30 – 49.55	35 – 30 c premium

There are 100 cents in 1 Buyland franc.

What is the estimated value of 3 million Buyland francs when sold to a bank three months forward?

10 A company has just sold a computerised manufacturing system to a Japanese car maker for 4,680 million yen receivable in three months' time. The company does not wish to bear the risk of fluctuating exchange rates and therefore intends to hedge the transaction on the forward exchange market at the following rates.

Spot	234.46 – 234.78 yen/Tk
Three months forward	2.72 – 2.56 yen premium

What amount of Taka will be received in three months' time?

11 A company invests Tk500,000 for one month in US dollar bonds. When the investment is made the treasurer will contract to convert the dollar investment back to Taka. The following data are available. US dollar bond rate is 1% per month.

Bank buys US dollars:		*Bank sells US dollars:*	
Spot	$1.8731	Spot	$1.8711
1 month premium	0.35 cents	1 month premium	0.33 cents

What is the interest received?

12 Mogs Ltd has recently purchased goods from Cantona, a French company.

Mogs Ltd was invoiced in Taka and payment for the goods was made after thirty days. During this period, the Taka strengthened against the euro.

Neither party to the transaction hedged against exchange rate risk.

What was the effect (gain/loss/no effect) of the change in exchange rates for Mogs Ltd and for Cantona?

13 Boris Ltd has agreed to purchase goods worth 10 million levs from a Bulgarian supplier. Payment for the goods is due in two months' time.

Which one of the following can be used to hedge against exchange rate risk?

A Buy a put option on Bulgarian levs
B Buy a call option on Bulgarian levs
C Use a money market hedge by borrowing Bulgarian levs now
D Enter into a forward contract to sell Bulgarian levs

14 Arold Ltd is expecting to pay $500,000 in four months' time to a US customer. To hedge against currency risk, the company enters into a forward exchange contract with a bank to buy $500,000 in four months' time.

Exchange rates are:

$/Tk spot 1.9015 – 1.9055
4-months forward $0.0030 – 0.0025 premium

What Taka amount will be paid by Arold Ltd in four months' time (to the nearest Tk)?

15 The US dollar/Taka spot rate is $1.52 = Tk1

One year US interest rates = 8%
One year Bangladesh interest rates = 14%

What should the one year forward exchange rate between the dollar and Taka be?

16 Shakes Ltd must pay a Gridland supplier 35,000 Gridland francs in one month's time. Given the following exchange rates being quoted by the company's bank, what would be the cost of the payment in Taka if the company were to arrange a one month forward exchange contract?

Francs – Tk rates:

Spot 9.22 1/4 – 9.23 1/4
1 month forward 4 1/2 c dis – 4 3/4 c dis

17 The current US dollar/Taka spot rate is $1.50 to Tk1, and the dollar is at a premium against Taka for forward exchange contracts.

What would happen to the spot rate and forward rates if interest rates went up in Bangladesh on Taka but not in the USA on the dollar?

18 Plane Tiff Ltd has just purchased goods from Sweden costing 200,000 Swedish krona. It is now 1 April and the supplier must be paid on 15 June. Plane Tiff Ltd's finance director wishes to hedge against foreign currency transaction exposure. Exchange rate details are:

On	1 April	9.90
	2 months forward	1¼ ore pm
	3 months forward	1¾ ore pm
On	15 June	9.92

(Note: there are 100 ore per krona)

How much would Plane Tiff Ltd pay on 15 June to obtain the Swedish currency that it requires, on the assumption that measures were taken on 1 April to hedge against the currency exposure?

19 Witneys Ltd has entered a transaction that will involve a yen payment exposure arising in six months' time. The company's treasurer decides to cover the exposure by means of foreign currency options, and buys a six-month yen call/Taka put option.

Forward exchange rate	240 yen = Tk1
Option strike price	240 yen = Tk1
Option premium	1.2%

What is the worst case exchange rate that the company will have to pay, and what would it do in six-months' time if the spot rate is 245 yen = Tk1?

20 On 12 July, the following figures are quoted.

Taka futures: contract size Tk62,500: price in $ per Tk

	12 July price
Sep	1.5552
Dec	1.5556
Mar	1.5564

(a) Your company, based in Bangladesh, will receive US $2,000,000 on 13 December. How should you hedge the receipt using futures? Assume that on 13 December the spot rate is quoted at 1.6502 and there is no basis risk.

(b) Starburst Ltd, a Bangladeshi company, expects to pay $5 million in eight months' time. How can it hedge this payment on the futures market? It is currently 12 July and the data in the above table applies. Assume that in 8 months' time the spot rate is quoted at 1.5504 and there is no basis risk.

21 XYZ Ltd has various long term investments in the USA.

An extract from its balance sheet at 31 December 20X1 is as follows. The exchange rate at that date was $1.80/Tk.

	Tk'000
Bangladesh assets	6,000
Overseas assets: $18 million @ $1.80/Tk =	10,000
	16,000
Bangladesh loan	(11,000)
Net assets	5,000

(a) Illustrate the impact on the company's gearing if the exchange rate moved to $2.00/Tk.

(b) Explain how any increase in gearing caused by exchange rate changes could be hedged by XYZ Ltd.

22 Milligan, a Bangladeshi company which trades frequently with the USA, has a net payment in three months' time of $25 million to make.

Market traded option prices (Tk31,250 contract size) in the USA are as follows. (The options relate to the purchase or sale of Taka.)

	June contracts		*September contracts*	
Exercise price ($/Tk)	*Calls*	*Puts*	*Calls*	*Puts*
1.98	1.65	0.41	2.38	0.71
2.00	0.56	1.20	1.01	1.57
2.02	0.17	2.65	0.48	3.45

Option premia are in cents per Taka and are payable up front. The options are American style. Assume that it is now 1 June and the current spot rate is $1.97/Tk.

(a) How many options contracts should Milligan enter into to hedge the transaction given, assuming a strike price of $2.00/Tk is chosen?

(b) Should Milligan enter into put or call options?

(c) Which date options should Milligan enter into?

(d) What will be the cost, expressed to the nearest dollar, of the premium to obtain the required number of contracts to hedge the transaction at a rate of $2/Tk?

(e) Assuming a strike price of $2, illustrate the impact of an options hedge assuming spot rates in three months of either

(i) $1.98/Tk
(ii) $2.02/Tk

23 RUTINI LTD

Rutini Ltd is a small manufacturing company which has recently completed a major contract in Europe, as a result of which it will receive €5 million in three months' time. Its directors are worried that the euro will weaken relative to Taka, and hence affect the company's cash flow. Four possible approaches have been suggested to deal with the foreign currency exposure.

(1) Do nothing now and convert the €5 million at the spot rate prevailing in three months' time

(2) Use the forward market to sell €5 million for Tks at today's three-month forward rate

(3) Buy today a three-month €5 million put option at a strike price equal to the three-month forward rate. The option will cost Tk125,000, which will be paid from the company's surplus cash currently in a bank deposit account

(4) Use the money market to cover the position.

The following relevant information has been collected.

(i) The spot rate is Tk1/€1.5575 – 1.5625

(ii) The three-month forward premium is €0.0047 – 0.0015

(iii) The current bank interest rates per annum are

	Eurozone	*Bangladesh*
Prime lending rate	3.2%	4.0%
Three-month deposit rate	2.8%	3.6%

Requirement

Calculate the effects of each of the four approaches, assuming that the spot rate prevailing in three months' time is Tk1/€1.50 and Tk1/€1.70. **(11 marks)**

24 POTION LTD

Potion Ltd has recently negotiated a contract with an American customer, Harding Inc. Under the terms of the contract Harding Inc will pay to Potion Ltd $1.5m in three months' time.

Potion Ltd is a little nervous that Harding Inc may not complete the deal. As a consequence it wishes to cover itself for this eventuality by adopting some form of risk reduction.

Two methods being discussed by management are a forward exchange contract and a foreign currency option.

Requirement

Describe why under the above circumstances the currency option is likely to be preferred to a forward exchange contract. (Your answer should consider the variety of possible circumstances that may arise with regard to the contract and future exchange rates.) **(12 marks)**

25 STORACE LTD

Storace Ltd has recently finalised a contract with a US company, Jacquin Inc, for the supply of a machine. The selling price is Tk100,000. As this is the first export sale made by Storace Ltd, the currency settlement details were not discussed at the meeting when the sale of the machine was agreed. The management of Storace Ltd believe that Jacquin Inc will agree to whatever currency settlement is suggested, since Jacquin Inc is very anxious that the machine contract be completed quickly. Delivery of the machine will take place in three months' time when the account will be settled immediately by Jacquin Inc.

The management of Storace Ltd are considering three possible methods of invoicing Jacquin Inc for the machine.

(1) Prepare the invoice in Taka (ie Tk100,000) and request payment in Taka on the settlement date.

(2) Convert the Taka price at the current Taka/dollar spot rate and invoice Jacquin Inc in dollars. Buy Taka at the spot rate in three months' time when the dollar settlement is made by Jacquin Inc.

(3) Invoice Jacquin Inc in dollars, converting the Taka price at the spot rate (as in (b)). Storace Ltd will then immediately cover the position in the forward exchange market by selling the dollars receivable forward at the three month forward exchange rate.

The current spot rate between Taka and dollars in London is Tk1 = $1.11. The premium for the dollar for three month forward exchange contracts is quoted as 1.20 - 1.15 cents (the buying/selling range). The management of Storace Ltd believe that the Taka/dollar spot rate will be somewhere in the range Tk1 = $1.20 to Tk1 = $1.09 in three months' time.

Requirements

(a) Calculate the amount of Taka to be received by Storace Ltd under each of the three methods. **(4 marks)**

(b) Prepare a report to the management of Storace Ltd which sets out the advantages and disadvantages of each method, and which contains your recommendation as to choice of method. **(12 marks)**

(c) What are the implications for financial management of undertaking a major export sales drive? **(4 marks)**

Note: Ignore taxation. **(20 marks)**

26 WHARTON LTD

Wharton Ltd (Wharton) is a manufacturer of men's clothing, which it sells to a wide range of customers in the retail sector. Based in Dhaka, Wharton sources its raw materials from a large number of suppliers both in the Bangladesh and overseas, and has a policy of extracting as much credit as possible from these suppliers. Annual demand for Wharton's products is relatively stable, although there can be some unpredictability as to when during the year this demand arises.

Historically, Wharton has sold only to customers within Bangladesh. However, on 31 May 20X1 it completed negotiations on a contract with a US company under which it will ship a consignment of goods to the US on 1 July 20X1. It is considering whether or not to hedge the foreign currency exposure arising from this sale and, if so, whether a forward contract or an option contract would be more appropriate.

The variable cost of the goods to be shipped is Tk1.5m while the contractually agreed selling price is $2.7 million, to be received on 31 August 20X1. As at 31 May 20X1 the $/Tk spot exchange rate was $1.50/Tk, while the three-month $/Tk forward exchange rate was $1.4956/Tk.

$ put/Tk call options with a maturity date of 31 August 20X1 are available with a range of exercise prices, including $1.50/Tk and $1.55/Tk.

Requirements

(a) Briefly outline the advantages and disadvantages of trade credit as a source of finance. **(3 marks)**

(b) If the $/Tk spot exchange rate on 31 August 20X1 is $1.53/Tk, calculate the contribution (ie sales proceeds less variable costs) from the sale under each of the following two scenarios.

(i) No hedging

(ii) Hedging using a forward contract. **(2 marks)**

(c) If the $/Tk spot exchange rate on 31 August 20X1 is $1.53/Tk and Wharton had chosen to hedge using an option, explain with reasons whether the option should be exercised if it had an exercise price of

(i) $1.50/Tk

(ii) $1.55/Tk. **(2 marks)**

(d) Briefly discuss the factors which Wharton should take into account when deciding whether or not to hedge. **(2 marks)**

(e) Indicate the relative advantages and disadvantages of the two option contracts and the forward contract available to Wharton. **(2 marks)**

(11 marks)

27 POTEN LTD

Poten Ltd has won a large export order to supply electrical components to an Eastern European manufacturer.

The finance director is concerned since this is the first export contract for the company. Here is a summary of his issues:

(a) What are the risks here? I don't mean currency risks. I mean everything else. **(3 marks)**

(b) Is it true that everyone exporting must take out export credit insurance? **(2 marks)**

(c) I've heard of something called a documentary credit, what are these exactly, and do they mean we have to wait until the end of the period of credit before receiving payment? **(2 marks)**

(d) I saw a website advertising the services of a factor. What is the significance of a factor purchasing bills without recourse? **(2 marks)**

(e) The same website referred to bills of exchange. How could these help, and what is meant by 'avalising' bills of exchange? **(2 marks)**

Requirements

Briefly discuss each of the issues outlined above. **(11 marks)**

28 JETAIR LTD

The finance director of JetAir Ltd, a rapidly expanding short haul airline company based in Bangladesh operating across the sub-continent, is considering how to hedge sales revenues of 60m rupee, which are due to be received in

180 days. The company has been quoted the following exchange and interest rates by one of its relationship banks:

Spot rate (rupee/Tk)	1.5642 – 1.5669
180 day forward rate (rupee/Tk)	1.5808 – 1.5830
Rupee interest rate	5 % per annum
Taka interest rate	4 % per annum

A foreign currency dealer at the relationship bank has also provided an estimate for the finance director of the rupee/Tk spot rate in 180 days. This estimate is 1.5622 - 1.5649. The bank is also quoting the following 180 day currency option strike prices each with an option premium of Tk20,000:

- A put option on 60m rupees at an exercise price (rupee/Tk) of 1.5700
- A call option on 60m rupees at an exercise price (rupee/Tk) of 1.5650

Requirements

(a) Calculate the hedged value of the company's rupee receivables and explain, with reasons, which hedging strategy is preferable, if it decides to:

(i) Use a forward market hedge to manage its foreign currency exposure;
(ii) Use a money market hedge to manage its foreign currency exposure. **(7 marks)**

(b) Given the estimated spot rate provided by the foreign currency dealer, discuss, with reasons:

(i) Whether the company should hedge the receipt of its rupee receivables in this situation; and

(ii) Your opinion on the ability of forecasters to outperform the forward market. **(4 marks)**

(c) Explain to the finance director how a currency option contract might be used to hedge the company's rupee receivables exposure in this situation and advise him of what action to take, having purchased the appropriate currency option, if in 180 days the spot rate for rupee/Tk is:

(i) In line with forward market expectations;
(ii) In line with the foreign currency dealer's estimate. **(6 marks)**

(d) Advise the finance director of the implications for financial management of the key financial risks arising from the company's recent rapid expansion into the sub-continent market.**(8 marks)**

(25 marks)

Note: Assume there are 360 days in a year

29 TAWTORR INTERNATIONAL PLC

(a) TawTorr International Ltd (TawTorr) is a large UK-based engineering company and the majority of its sales are made in Europe and North America. The company's suppliers are mostly British, but one, Grupo MBV (MBV), is based in Spain and invoices TawTorr in euro. A contract worth €3.1 million was agreed with MBV on 29 February 20X2. The value of Sterling has been volatile in the past six months and has depreciated against the euro by almost 5% since August 20X1. Because of this and the scale of this transaction, TawTorr's board is keen to investigate how the €3.1 million payment might be hedged in order to reduce the risk from adverse movements in the Sterling/euro exchange rate. The €3.1 million is due to be paid by TawTorr on 31 May 20X2 and you have been asked to provide information for the board.

You should assume that the current date is 29 February 20X2.

Following discussions with TawTorr's bank you have collated the following data:

Spot rate (€/£)		1.145 – 1.150
Over-the-counter (OTC) option on €3.1 million		
	Put (€/£)	1.160
	Call (€/£)	1.155
OTC option premium payable		£30,000
Sterling interest rate (lending)		4.2% pa
Sterling interest rate (borrowing)		4.8% pa
Euro interest rate (lending)		6.9% pa
Euro interest rate (borrowing)		7.8% pa
Forward rate at 31 May 20X2		€0.008 – €0.010 discount
Cost of forward contract		£5,000

Requirements

(i) Calculate the impact on TawTorr's Sterling payment to MBV of a 2.5% change in the spot value of Sterling against the euro (both strengthening and weakening) over the next three months.**(3 marks)**

(ii) Calculate the Sterling payment that would be made on 31 May 20X2 if TawTorr made use of:

- An OTC currency option
- A money market hedge
- A forward contract **(7 marks)**

(iii) Taking into account your calculations in parts (i) and (ii) above, discuss the issues that should be taken account of by TawTorr's board when considering whether it should hedge the payment to MBV. **(6 marks)**

(b) Over the past five years TawTorr has also been investing in large company BANGLADESH shares and at 29 February 20X2 had a portfolio worth £3.6 million. The spot value of the FTSE100 index on that date is 4,800. TawTorr's finance team is considering the use of traded FTSE100 index options to protect the current value of the portfolio in anticipation of share prices falling over the next three months. The team has collected the following information from Euronext.Liffe:

FTSE 100 INDEX OPTION (£10 per full index point)

Exercise price	4750		4800		4850		4900		4950	
	Call	Put	Call	Put	Call	Put	Call	Put	Call	Put
March 20X2	148	42	112	59	83	78	57	108	43	142
April 20X2	223	104	193	124	163	144	134	168	113	199
May 20X2	285	144	254	165	230	189	199	210	175	234

Requirement

Explain, with supporting calculations, the outcome of hedging using FTSE100 index options if on 31 May 20X2:

(i) The portfolio value falls to £3.45 million and the FTSE100 index falls to 4,600.
(ii) The portfolio value rises to £3.675 million and the FTSE100 index rises to 4,900.

(7 marks)

(23 marks)

30 DEEP DRILL SUPPLIES LTD

Deep Drill Supplies Ltd (DDS) is a Bangladeshi company which manufactures and sells large-scale components for the oil and gas industries. As the majority of its customers are international, the DDS board is considering whether the company should be hedging its exposure to foreign exchange risk. One of its key customers is NSDF, a Norwegian oil exploration company.

DDS and NSDF have recently agreed a contract (DDS/12/57) for the supply of a large consignment of components. DDS will start manufacturing these at the end of September 20X1 and the work will be completed in the summer of 20X2. DDS will receive the agreed contract price, 16.75 million Norwegian kroner (NK), on 30 September 20X2.

Information regarding the Bangladesh and Norwegian currencies is given in the table below:

Table

(1) Recent research paid for by DDS produced the following forecast spot rates for NK/Tk at 30 September 20X2:

	Probability
9.200 – 9.230	10%
9.300 – 9.330	10%
9.400 – 9.430	40%
9.500 – 9.530	40%

(2) Spot rate (NK/Tk) 9.300 – 9.325

(3) Forward rate at 30 September 20X2 offered by DDS's bank : 0.10 – 0.13 NK discount

Current interest rates	Borrowing	Depositing
NK	6.60% pa	5.70% pa
Taka (Tk)	5.40% pa	4.30% pa

(4) DDS's bank has quoted the following twelve month currency over-the-counter options each with a premium of Tk25,000:

A put option on 16.75 million NK at an exercise price (NK/Tk) of 9.300
A call option on 16.75 million NK at an exercise price (NK/Tk) of 9.250

Looking ahead, the DDS board has also identified a surplus of funds denominated in Taka. It is planning to invest this in March 20X2 in an interest-bearing Bangladesh deposit account for a period of six months. It would like to investigate how it might hedge against adverse interest rate movements.

Requirements

(a) Assuming the current date is 30 September 20X1, calculate the Taka amount receivable by DDS on 30 September 20X2 if it uses:

(i) The expected spot rate in 12 months' time

(ii) A forward contract

(iii) A money market hedge

(iv) An option. **(10 marks)**

(b) Making reference to your calculations in part (a) discuss the issues that should be taken into account by the DDS board when it considers whether it should hedge the NSDF receipt. **(8 marks)**

(c) Advise the DDS board as to the effectiveness of employing the following methods of hedging the company's exposure to interest rate risk on the proposed investment of the surplus funds in March 20X2:

(i) A Forward Rate Agreement (FRA)

(ii) An interest rate future

(iii) An interest rate option

(iv) An interest rate swap. **(8 marks)**

(26 marks)

Now, go back to the Learning Objectives in the Introduction. If you are satisfied you have achieved these objectives, please tick them off.

Answers to Interactive questions

Answer to Interactive question 1

(a) The bank is being asked to buy the Danish kroners and will give the exporter:

$$\frac{150,000}{9.5380} = \text{Tk15,726.57 in exchange}$$

(b) The bank is being asked to sell the yen to the importer and will charge for the currency:

$$\frac{1,000,000}{203.650} = \text{Tk4,910.39}$$

Answer to Interactive question 2

(a) If the actual spot rate for Bulldog to buy and the bank to sell the Reds is 3.0800, the result is as follows.

	Tk
Revenue from re-sale	32,000.00
Less cost (100,000 ÷ 3.0800)	32,467.53
Loss	(467.53)

(b) If the actual spot rate for Bulldog to buy and the bank to sell the Reds is 4.0650, the result is as follows.

	Tk
Revenue from re-sale	32,000.00
Less cost (100,000 ÷ 4.0650)	24,600.25
Profit	7,399.75

This variation in the final Taka cost of the goods (and thus the profit) illustrates the concept of transaction risk.

Answer to Interactive question 3

Using interest rate parity, dollar is the numerator and Taka is the denominator. So the expected future exchange rate dollar/Taka is given by:

$$\$1.95/\text{Tk} \times \frac{1.06}{1.05} = \$1.9686/\text{Tk}$$

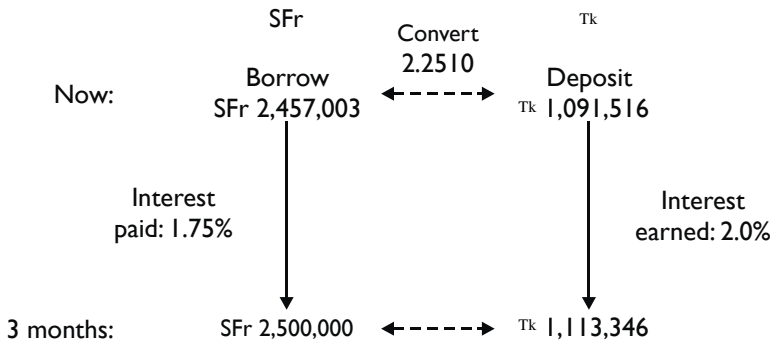
This prediction is subject to great inaccuracy, but note that the company could 'lock into' this exchange rate, working a money market hedge by borrowing today in dollars at 6%, converting the cash to Taka spot and putting them on deposit at 5%. When the dollars are received from the customer, the dollar loan is repaid.

Answer to Interactive question 4

The interest rates for three months are 2.00% to deposit in Taka and 1.75% to borrow in Swiss francs. The company needs to borrow SFr2,500,000/1.0175 = SFr 2,457,003 today. These Swiss francs will be converted Tk at 2,457,003/2.2510 = Tk1,091,516. The company must deposit this amount and, with three months interest of 2.00%, will have earned

Tk1,091,516 × (1 + 0.02) = Tk1,113,346

Thus, in three months, the loan will be paid out of the proceeds from the debtor and the company will receive Tk1,113,346. The effective forward rate which the company has 'manufactured' is 2,500,000/1,113,346 = 2.2455. This effective forward rate shows the Swiss franc at a premium to the Taka because the Swiss franc interest rate is lower than the Taka rate.



Answer to Interactive question 5

The three choices must be compared on a similar basis, which means working out the cost of each to Trumpton either now or in three months' time. In the following paragraphs, the cost to Trumpton now will be determined.

Choice 1: the forward exchange market

Trumpton must buy dollars in order to pay the US supplier. The exchange rate in a forward exchange contract to buy $4,000,000 in three months time (bank sells) is:

	$
Spot rate	1.8625
Less three months premium	0.0180
Forward rate	1.8445

The cost of the $4,000,000 to Trumpton in three months' time will be:

$$\frac{\$4,000,000}{1.8445} = \text{Tk}2,168,609.38$$

This is the cost in **three months**. To work out the cost now, we could say that by deferring payment for three months, the company is:

- Saving having to borrow money now at 14.25% a year to make the payment now, or
- Avoiding the loss of interest on cash on deposit, earning 11% a year

The choice between (a) and (b) depends on whether Trumpton Ltd needs to borrow to make any current payment (a) or is cash rich (b). Here, assumption (a) is selected, but (b) might in fact apply.

At an annual interest rate of 14.25% the rate for three months is 14.25/4 = 3.5625%. The 'present cost' of Tk2,168,609.38 in three months' time is:

$$\frac{\text{Tk}2,168,609.38}{1.035625} = \text{Tk}2,094,010.26$$

Choice 2: the money markets

Using the money markets involves

(a) **Borrowing in the foreign currency**, if the company will eventually receive the currency

(b) **Lending in the foreign currency**, if the company will eventually pay the currency. Here, Trumpton will pay $4,000,000 and so it would lend US dollars.

It would lend enough US dollars for three months, so that the principal repaid in three months time plus interest will amount to the payment due of $4,000,000.

(a) Since the US dollar deposit rate is 7%, the rate for three months is approximately 7/4 = 1.75%.

(b) To earn $4,000,000 in three months' time at 1.75% interest, Trumpton would have to lend now:

$$\frac{\$4,000,000}{1.0175} = \$3,931,203.93$$

These dollars would have to be purchased now at the spot rate of (bank sells) $1.8625. The cost would be:

$$\frac{\$3,931,203.93}{1.8625} = \text{Tk}2,110,713.52$$

By lending US dollars for three months, Trumpton is matching eventual receipts and payments in US dollars, and so has hedged against foreign exchange risk.

Choice 3: lead payments

Lead payments should be considered when the currency of payment is expected to strengthen over time, and is quoted forward at a premium on the foreign exchange market. Here, the cost of a lead payment (paying $4,000,000 now) would be $4,000,000 ÷ 1.8625 = Tk2,147,651.01.

Summary

	Tk
Forward exchange contract	2,094,010.26 (cheapest)
Currency lending	2,110,713.52
Lead payment	2,147,651.01

Answers to Self-test

1 C The importer will need to enter into an arrangement under which (ultimately) Taka are sold and Swiss francs are bought. Only A and C fit the bill. However, A leaves the importer open to exchange rate fluctuations between now and three months' time. Only C will eliminate the risk (since the spot rate and the three months' SFr interest rate are certain).

2 Since the sale is to be invoiced in the Swedish currency, the importer will suffer no gain or loss. However, if the Taka weakens, the exporter will be able to exchange the Kroner for a greater number of Taka, and will therefore make a gain.

3 A The company will receive $400,000 in three months; it will wish to sell those at a rate determined today under a forward contract.

4 C Bangladeshi company needs to sell US dollars and buy Tk

A equivalent to selling Taka
B equivalent to buying dollars (sold the right to someone else to sell you dollars)
C equivalent to buying Taka
D equivalent to buying dollars

5 Forward selling rate = 1.875 – 0.015 = 1.86 (remember to deduct a premium)

Therefore Taka value = $\frac{10{,}000}{1.86}$ = Tk5,376

6

	$
Dollar bonds purchased = Tk500,000 × 1.8711	*935,550.00*
Interest earned at 1%	*9,355.50*
	944,905.50

In one month's time bank's buying rate will be $1.8731 – 0.0035 = $1.8696.

Therefore Taka received = $\frac{\$944{,}905.50}{\$1.8696}$ = Tk505,405

7 Bank sells low, buys high

Forward rate = $(1.7680 – 0.0035)

= $1.7645

Receipt = $\frac{\$200{,}000}{1.7645}$

= Tk113,347

8

Spot	1.5954	–	1.5974
1 month	0.0150	–	0.005 pm (deduct)
	1.5804	–	1.5924

If we are buying euros we will need the dealer's selling rate - ie 1.5804.

9 $\frac{\text{F}3{,}000{,}000}{49.55 - 0.30}$ = Tk60,914

10

Spot rate	234.46	–	234.78
3-month premium	2.72	–	2.56
	231.74	–	232.22

(Remember to deduct a premium)

We are selling yen in three months' time, and so must use the dealer's buying rate of 232.22.

Therefore amount receivable = $\frac{4{,}680\text{m}}{232.22}$ = Tk20,153,303

11 Tk500,000 converted into $ at the spot rate gives Tk500,000 × 1.8711 = $935,550.

Interest thereon at 1% = $9,355.5.

This will be converted back to Tk at the forward rate $(1.8731 – 0.0035) = $1.8696, which gives $9,355.5 ÷ 1.8696 = Tk5,004.

Note: this is not the total income from the transaction. There will also be an exchange gain on the principal.

12 Mogs Ltd is invoiced in Taka and so exchange rate movements will have no effect.

Cantona invoiced the sale in Taka. As the Taka strengthened (ie more euros to Tk) against the euro, the amount received, when converted to euros, will be higher. Hence a gain will be experienced.

13 B (1) A put option gives the holder the right to sell the underlying which is relevant where the company expects to receive foreign currency in the future.

(2) A call option gives the holder the right to buy the underlying item and is relevant where a company expects to pay foreign currency in the future.

(3) Borrowing Bulgarian levs is appropriate when levs are expected to be received in the future.

(4) A forward contract to sell Bulgarian levs will not hedge against the risk.

14 Forward rate $(1.9015 – 0.0030) = $1.8985

Taka conversion = $500,000/$1.8985
= Tk263,366

15 $1.4400 to Tk1

$1.52 × 1.08/1.14 = $1.4400

16 Tk3,776.64

35,000/(9.2225 + 0.045) = Tk3,776.64

The company is buying francs (in order to pay the overseas supplier) and so the bank is selling. Forward rates are at a discount to spot rates, and discounts must be added.

17 The dollar would weaken and the forward premium would increase.

The increase in Bangladesh interest rates would strengthen Taka against the dollar at the spot rate, because Taka becomes a more attractive currency to buy and invest in.

The forward rate premium is measured approximately by

$$\frac{1 + \text{US dollar interest rate}}{1 + \text{Taka interest rate}}$$

So, for example, if US interest rates are 9%, and Bangladesh rates went up from 14% to 15%, the forward rate would change from 1.09/1.14 = 0.956 to 1.09/1.15 = 0.948 of the spot rate. The premium would increase from 0.044 (4.4% of the spot rate) to 0.052 (5.2% of the spot rate).

18 Tk20,238.

The company wants the currency two and a half months from now, and the bank will quote a rate for the krona under a forward exchange option agreement. This will give the company the choice of when to obtain the currency at any time between two months and three months from the date of agreeing the contract – here, at any time between 1 June and 1 July

	2-month rate	3-month rate
Spot	9.90	9.90
Premium (deduct)	1¼	1¾
Forward rate	9.8875	9.8825

The forward rate will be either the two month forward rate or the three month forward rate, whichever is more beneficial for the bank.

The bank is selling krona, and so the lower of these rates will be used.

Cost 200,000/9.8825 = Tk20,237.79.

19 237.1 and let the option lapse.

The option premium makes foreign currency options quite expensive, and could therefore be unsuitable for any company trading on narrow profit margins. Options are often used by companies faced with (1) a currency exposure that might not arise at all or (2) where the amount of the total receipt or payment is uncertain.

Option premium = 240 × 1.2% = 2.88 yen

Worst case = 240 – 2.88 = 237.12 yen

If the spot rate in six months' time is 245, the company will allow the option to lapse, and buy yen at the spot rate; its all-in cost would be 245–2.88 option premium = 242.12 yen to Tk1.

20 (a) **Set up the hedge**

The receipt of dollars is hedged by buying Taka futures now (12 July) and selling Taka futures on 13 December. The September contract will be no use because it expires on 30 September. Either of the other two contracts can be used. It is usual to choose the contract which expires next after 13 December. This is the December contract which expires on 31 December.

Assuming the December contract is chosen, the receipt of $2,000,000 converts, using the futures contract price, to $2,000,000/1.5556 = Tk1,285,678. The contract size is Tk62,500. The number of contracts to be bought is Tk1,285,678/Tk62,500 = 20.57, rounded to 21 contracts.

On 12 July, buy twenty-one December Taka contracts at $/Tk 1.5556. On 13 December, sell twenty-one December Taka contracts.

Futures position

		$
12 July – buy Taka at		1.5556
13 December – sell Taka at		1.6502
		$0.0946/Tk
Gain on futures trade	= $0.0946 × Tk62,500 × 21 contracts	
	= $124,163	

Spot market

	$
Receipt from customer	2,000,000
Gain on futures market	124,163
	2,124,163
Sold at prevailing spot rate	$1.6502/Tk
	Tk1,287,215

(b) The Bangladeshi company can hedge the payment of $5 million as follows:

Set up hedge

- Buying dollars equates to selling Taka
- 8 months from July includes February. The March future is therefore most appropriate, as the December future will close out too soon.
- The company will therefore sell March Taka contracts at $1.5564

$5 million @ 1.5564 = Tk3,212,542 Taka sold ÷ Tk62,500
= 51.4 contracts – rounded to 51 contracts

Futures position

	$
Sell Taka at	1.5564
Buy Taka at	1.5504
Gain on futures	$0.0060/Tk
	× Tk62,500
	× 51 contracts
Overall gain on futures	$19,125

Spot market

	$
Value of gain on futures	19,125
Payment to customer	(5,000,000)
Total amount required	(4,980,875)
Bought at prevailing spot rate	$1.5504/Tk
Overall cost	Tk3,212,639

(works out to be the equivalent of $1.5564/Tk – so matches the future rate)

21 (a)

	31/12/X1	
Exchange rate	$1.80/Tk	$2.00/Tk
	Tk'000	Tk'000
Tk value of $18,000 asset =	10,000	9,000
Bangladesh assets	6,000	6,000
	16,000	15,000
Bangladesh loan	(11,000)	(11,000)
Net assets	5,000	4,000
Gearing ratio	11/16 = 68.75%	11/15 = 73.33%

(b) The increase in gearing caused by the drop in the Tk value of net assets or equity could be mitigated by a similar drop in the Tk value of the debt. Thus financing the overseas assets by raising capital in $ would stop the relative gearing level rising by as much.

22 (a) Number of contracts:

$25 million @ $2/Tk = Tk12,500,000

$$\frac{\text{Tk } 12,500,000}{\text{Tk } 31,250} = 400 \text{ contracts}$$

(b) The company needs to buy $ and therefore needs to sell Taka – a put option

(c) It is currently 1 June – the payment is required in three months ie at the end of August.

June options will close out too soon, September contracts are required.

(d) The cost of a September put option at $2/Tk is $0.0157/Tk

The total cost of 400 contracts is

400 × Tk31,250 × $0.0157/Tk = $196,250

Paid now @ $1.97 = Tk99,619

(e) **Position in options market**

		(i) $/Tk	(ii) $/Tk
Prevailing rate		1.98	2.02
Option - right to sell Taka for		2.00	2.00
Value of option		$0.02/Tk	zero
		∴ Exercise	∴ Abandon
Total value of option		$0.02/Tk	
	××	Tk31,250	
	×	400 contracts	
		$250,000	
Position in spot market		$	$
Amount due to supplier		25,000,000	25,000,000
Gain on option		(250,000)	–
Total currency required		24,750,000	25,000,000
Prevailing spot		$1.98/Tk	$2.02/Tk
Cost at prevailing spot		Tk12,500,000	Tk12,376,237
Plus cost of premium		Tk99,619	Tk99,619
Total cost		Tk12,599,619	Tk12,475,856

23 RUTINI LTD

Calculate the effects of each of the four approaches

(a) **Convert at spot in three months' time**

(1) If exchange rate is Tk1/€1.50
€5m/1.50 = Tk3,333,333 (receivable in three months' time)

(2) If exchange rate is Tk1/€1.70
€5m/1.70 = Tk2,941,176 (receivable in three months' time)

(b) **Use the forward market**

3-month forward sell rate = 1.5625 − 0.0015
= €1.561

€5m/1.561 = Tk3,203,075 (receivable in three months' time)

(c) **Buy a €5m put option**

(1) Exchange rate in three months: Tk1/€1.50

In this case the company will not exercise the option but will convert at spot.

€5m/1.50 = Tk3,333,333

(2) Exchange rate in three months: Tk1/€1.70

In this case the company will exercise the option and convert at the strike price of €1.561.

€5m/1.561 = Tk3,203,075

In both cases the company will have paid Tk125,000 for the option. If it is assumed that this is currently invested at the three-month Taka deposit rate of 3.6% pa, this will effectively cost (when interest is taken into account)

125,000 × 1.009 = Tk126,125

(d) **Money market cover**

$$\text{Borrow} = \frac{€5m}{1+\frac{0.032}{4}} = €4{,}960{,}317$$

Convert at spot = €4,960,317 ÷ 1.5625
= Tk3,174,603

Invest for 3 months = Tk3,174,603 × (1 + 0.009)
= Tk3,203,174

Summary

Cash receipts in three months' time (in Tk)

		Spot rate in three months	
		Tk1/€1.50	Tk1/€1.70
(i)	Conversion at spot	3,333,333	2,941,176
(ii)	Using the forward market	3,203,075	3,203,075
(iii)	Buying a €5m put option		
	Before interest cost	3,333,333	3,203,075
	After interest cost (Tk126,125)	3,207,208	3,076,950
(iv)	Borrowing € and investing Tk	3,203,174	3,203,174

24 POTION LTD

A forward exchange contract is binding in that, once entered into, Potion Ltd must comply with its terms irrespective of what the other party does.

If, for example, Harding Inc does not pay the $1.5m on the pre-determined date, Potion Ltd will still have to sell $1.5m to the other party to the contract. This would necessitate Potion Ltd buying $1.5m at spot on that date and then re-selling the dollars at the agreed forward exchange rate.

This could work to Potion Ltd's advantage if the rates were to move favourably, but extra commission costs would have to be paid and the reverse situation, where rates move against the company, could lead to significant translation losses.

Another aspect of the forward exchange contract is that if Harding Inc honours its side of the contract but the spot rate is now more preferable than the previously negotiated forward exchange rate, then it is not possible to convert the $1.5m at the more advantageous rate on the day of receipt.

Both of these situations can be avoided by using a currency option. It will also give Potion Ltd more flexibility. Potion Ltd could buy an American put option at the start of the contract to have the right, but not the obligation, to sell dollars at an agreed rate at any time up to the date of receipt of the $1.5m.

(a) If Harding Inc fails to deliver the currency, Potion Ltd could merely let the option lapse, since no currency needs to be converted to Taka. Admittedly the premium paid on the option is a cost, but this is likely to be relatively small compared with the underlying Taka equivalent value of $1.5m.

(b) In the event of Harding Inc failing to comply, Potion Ltd can still use the option to its advantage. If the exchange rate were to move such that the buying rate were higher than the agreed option selling rate for dollars (for example option selling price Tk1 = $1.5; current exchange rate to buy dollars Tk1 = $1.6), then Potion Ltd could, at any time up to the exercise date, buy dollars at this favourable rate and then resell them at the favourable option rate, thus generating a gain.

(c) If Harding Inc does pay for the contract, then Potion Ltd still has the right to choose between the option price and the spot rate on the day the dollars are received, ie by letting the option lapse if the spot rate is favourable or by exercising the option if the option rate is preferable.

25 STORACE LTD

(a) **Taka**

Amount of Taka to be received by Storace Ltd

Method (i) Invoice in Taka

Cash received = Tk100,000

Method (ii) Convert price to dollars now at current rate, ie

Tk100,000 × 1.11 = $111,000

Receive $111,000 in three months and convert to Taka

Best outcome	$111,000 ÷ 1.09 = Tk101,835
Worst outcome	$111,000 ÷ 1.20 = Tk92,500

Method (iii) Since we are to invoice in dollars now ($111,000), we need to sell the dollars forward three months.

The forward rate = Spot rate less premium.

The appropriate premium to take is 1.15 cents, which applies to selling dollars for Taka (check: to sell dollars the bank require more dollars for our pound than if we buy dollars).

Thus forward rate = $(1.11 – 0.0115) = $1.0985

We therefore enter into a forward contract now which will enable us to receive with certainty in three months $111,000 ÷ 1.0985 = Tk101,047.

(b) **Report**

To	The directors of Storace Ltd
From	Consultants
Date	Today
Subject	Best method of invoicing for the export sale of a machine

This report considers the advantages and disadvantages of the three methods of invoicing which you are considering.

(i) **Invoicing in Taka**

This has the advantage of guaranteeing the sum which is receivable in three months as Tk100,000. There is no bankers' commission for handling foreign exchange. The sale can be treated exactly as an ordinary Bangladesh sale and there are no problems with entering it into the books of account.

However, the cash received will be less than that received in method (iii), which is only slightly more risky.

(ii) **Invoicing in dollars with no forward contract**

Given that the sale has already been finalised and that the customer will not mind which currency is used for the invoice, the only advantage of this method is the gain which will be made if the pound falls against the dollar.

The disadvantage is the loss which will be made if the pound rises. Since it is expected that the pound is more likely to rise than fall, this is not thought to be a good gamble. Most financial managers take the view that it is better to minimise currency risk rather than to speculate.

(iii) **Invoicing in dollars with forward contract**

The forward contract eliminates the risk from currency fluctuations. Thus, assuming that the customer pays on time and does not default, the Taka value of the sales proceeds can effectively be decided now. The figures show that this is Tk101,047, which, even after bankers' commission, is higher than the value of Tk100,000 if the invoice were in Taka.

If the customer defaults, then you must still honour the contract to sell the dollars for Tk1 = $1.0985 in three months' time. In order to do this you will have to buy dollars at the spot rate. If this is lower than $1.0985 then you will make an exchange loss.

If the customer does not pay on time, then you may extend the forward contract by closing off the original deal and entering into a new deal. Again, this will result in an exchange difference, though very small.

Alternatively you may decide that it is better to sign the original deal as an option forward contract, in which a range of possible maturity dates is specified instead of just one date.

Conclusion

Since the risk of default is regarded as small, we recommend that you adopt method (iii) in invoicing Jacquin Inc.

(c) **Implications for financial management of undertaking a major export sales drive**

Currency problems

The first problem is the decision whether to invoice in Taka or the customer's currency (or some other acceptable currency such as dollars).

The advantage of invoicing in Taka is that no problems are posed in handling or accounting for foreign exchange. However, Taka may not prove popular with customers, and sales may be lost as a result. Moreover, currency fluctuations will mean that if sales are invoiced in Taka, prices must be regularly revised in order to stay competitive.

Invoicing in foreign currencies will probably boost sales, but brings with it the problems of exchange rate exposure. Although taking a speculative approach to exchange rate movements is not necessarily wrong, the usual view is that the firm is in business to sell, not to play the markets, and shareholders will not welcome the taking of unnecessary risks.

Currency exposure on export sales can be eliminated by various "hedging" operations, such as

(i) Forward contracts with bankers, in which the foreign currency to be received is sold forward to the expected date of receipt (or range of dates)

(ii) Similar transactions using the currency futures market

(iii) Taking out overdrafts in foreign currencies involved and using the receipts from foreign receivables to reduce the overdraft. The idea is to match assets and liabilities in each foreign currency, but this should be done in economic rather than accounting terms, so that each overdraft should equal the total value of invoices plus the order book in that currency.

The money markets do not handle many of the world's currencies, in which case a substitute currency should be used for invoicing and/or for hedging. For instance, the Kuwaiti dinar is strongly correlated with the dollar, whereas the Nigerian naira is strongly correlated with Taka. Any firm selling into a number of overseas markets would be well advised to construct a table of these currency dependencies. The most popular proxy currencies to use are the US dollar, the Euro, the Japanese yen and of course the Taka.

If overseas operations are to increase significantly, it will be necessary to train a member of staff in foreign exchange problems, or possibly to recruit an expert.

Trading risks

Apart from the exchange risk, the normal problems of selling on credit will be increased in foreign countries because of lack of knowledge of the business environment and customary trade credit periods, the need to give longer credit periods to beat the competition, possible political risks including exchange control problems, and the distance of the customer making bad debts or delayed receipts more likely. It will probably be necessary in some countries to appoint an agent to collect debts.

The Export Credits Guarantee Department, a government body, provides insurance to cover the risks of bad debts from overseas trading although its short-term business (less than two years) has been taken over by a Dutch concern, NCM. This insurance covers both commercial and political risks.

Increased finance requirements

Any increase in sales will cause a need for increased working capital. For overseas sales the need is greater because the credit periods involved are usually longer. The methods of raising funds, which are specific to export sales, include

(i) Foreign bills of exchange, or letters of credit discounted with a bank

(ii) Export factoring, which can provide a sales ledger service in all major currencies as well as an advance of funds

(iii) Bank loans guaranteed by the ECGD or NCM. These organisations run many schemes to assist exporters, and their help should be sought before embarking on the sales drive.

26 WHARTON LTD

(a) **Advantages/disadvantages of trade credit**

Advantages

- Convenient and informal
- Can be used if more formal sources of finance unavailable
- Can be used with little planning to overcome short-term cash flow difficulties.

Disadvantages

- May be expensive (can involve not taking prompt payment discounts)
- Can damage supplier goodwill if abused.

(b) **Contribution calculations**

No hedging

$$\frac{2.7}{1.53} - 1.5 = \text{Tk}0.265\text{m}$$

Hedging with forward

$$\frac{2.7}{1.4956} - 1.5 = \text{Tk}0.305\text{m}$$

(c) **Option 1**

Hedging with 1.50 option

Exercise – better to convert at 1.50 than at spot rate of 1.53.

Hedging with 1.55 option

Not exercise – better to convert at spot rate of 1.53 rather than 1.55.

(d) **Hedging**

Need to consider corporate objectives and level of corporate risk aversion.

Hedging is zero NPV if instruments are fairly priced, so should be a priori indifferent.

However, factors such as managerial compensation contracts, tax, bankruptcy costs, etc may create a role for hedging.

(e) **Relative advantages/disadvantages**

Forward – no premium but locked in, ie have to use even if would prefer to sell at spot.

Option – pay premium but have option to sell at spot if beneficial.

27 POTEN LTD

The risks facing a Bangladeshi company exporting components to Eastern Europe include the following:

The logistics of transport	The greater distance will incur higher costs of haulage. The goods will be in transit for longer, which means there will be an increased cost of insurance, and a greater chance that something will go wrong eg breakdown, damage, theft etc.
The time period increases	The amount of time the inventory is in transit means greater financial pressures, as it needs to be financed from the time the exporter buys the goods until the customer pays for them.
Increased credit risk	When faced with Bangladeshi customers who do not pay on time, the company will be on familiar territory in terms of instigating a process to recover the goods or the outstanding payment. If a customer in Eastern Europe delays payment, the process is likely to be much more involved.

In summary, exporting will create increased financial cost and credit risks for the company.

Some exporters do not use export credit insurance as the costs are too high. However, the situation faced by Poten Limited suggests that some protective measures are required.

A documentary credit – or a letter of credit – is an assurance by a bank that they will guarantee payment when the money is due. It is possible to obtain immediate payment (subject to a discount) from a bank when a letter of credit is in place.

The benefit of a non-recourse factor is that if the client's debtors do not pay what they owe, the factor will not ask for the money back.

A bill of exchange is an acceptance to pay an amount on a certain date. Avalising bills of exchange is where the buyer's bank adds its name to a bill, to indicate it guarantees payment at maturity.

28 JETAIR LTD

(a) (i) By selling the receipts forward, the company can lock in a Taka value of 60,000,000/1.5830 = Tk37,902,716.

(ii) The company can also hedge its euro receivables by borrowing €58,536,585 (the present value of €60,000,000 at a 180-day interest rate of 2.5% (5.0% × 180/360)); sell the proceeds in the spot market at a rate of 1.5669 euro/Tk (giving Tk37,358,213); and invest the Taka proceeds at a 180-day interest rate of 2.0% (4.0% × 180/360) to produce Tk38,105,377. Using a money market hedge, therefore, the company can lock in a Taka value of [60,000,000/(1+ 0.025)]/1.5669 × (1+0.02) = Tk38,105,377.

The money market hedge yields a higher Taka value for the euro receipts and so is preferable.

(b) Based on the advice that the future spot rate will be lower than the current forward rate, it would appear that the company would be better off waiting to convert its sales at the future spot rate.

However, the finance director should consider whether the dealer has private information that is not yet reflected in the current market rates and why s/he is willing to give it to the company. Without such information, it would in general be difficult to outperform the foreign exchange market, as if the market was efficient the forward rate would reflect the most likely value of the future spot rate.

(c) A currency option contract gives the holder the right but not the obligation to buy or sell currency at some future time at a pre-determined rate of exchange. Here the company would buy a put option on the euro (or a call option on the Tk), which would give the company the right to sell euros and receive Tks. If the spot exchange rate moves against the company, the option can be exercised in order to limit the company's loss. However, if the spot exchange rate moves in favour of the company, the option can be allowed to lapse with the company dealing at the prevailing spot rate. Downside risk is, therefore, eliminated whilst upside potential is retained, although, of course, an option premium is the price paid to benefit from this flexibility.

If the future euro/Tk spot rate = 1.5830 (forward market expectations), the company should exercise the option @ 1.5700 yielding Tk38,216,560 – 20,000 = Tk38,196,560 (which exceeds the spot value of Tk37,882,716 net of the premium assuming the premium is payable after 180 days).

If the future euro/Tk spot rate = 1.5649 (dealer's estimate), the company should let the option lapse and deal at the spot rate, yielding Tk38,321,108 net.

(d) The implications for financial management comprise:

1 **Transaction risk** – the uncertainty caused by fluctuations in exchange rates between the date of entering into a foreign currency-denominated contract and the date of settlement of that contract.

This gives rise to the need to decide upon an invoicing strategy – whether to invoice in Taka, thereby removing all transaction risk but potentially putting sales in jeopardy, or to invoice in the customer's currency (or some other acceptable currency), thereby potentially winning business but exposing the business to transaction risk, when shareholders are unlikely to want the company to speculate on market movements.

This gives rise to the need to develop a suitable hedging strategy in respect of the company's export sales using, potentially, forward contracts, money market hedges, options and futures contracts, foreign currency bank accounts and borrowings (which would be repaid from foreign currency receivables) and matching/netting of foreign currency assets and liabilities.

2 **Economic risk** – this is the long-term version of transaction risk and arises from variations in the overall value of the business (the PV of future cash flows) due to unexpected changes in exchange rates.

3 **Credit/Trading risk** – selling on credit in overseas markets is often riskier than doing so domestically and also often involves granting extended credit terms. Both of these increase the risk of bad debts. There is also political risk (potential exchange control legislation and the like). These risks give rise to the need to consider credit insurance covering both commercial and political risks through organisations, (such as ECGD and NCM in UK).

4 **Increased financial requirements** – increased sales overseas will create a need for increased working capital which gives rise to a need to consider various export credit facilities such as bills of exchange, discounted letters of credit, export factoring and ECGD/NCM-guaranteed loan finance.

29 TAWTORR INTERNATIONAL LTD

(a) (i)

Spot rate at 29 February 20X2 = €1.145/£	
Sterling payment at current spot rate = €3.1m/1.145	£2,707,424
If the euro strengthened by 2.5%, the spot rate would be 1.145 × 0.975	1.116
So the Sterling payment = €3.1m/1.116	£2,777,778
If the euro weakened by 2.5%, the spot rate would be 1.145 × 1.025	1.174
So the Sterling payment = €3.1m/1.174	£2,640,545

(ii) Option

Call option (buy €) exchange rate is	€1.155/£	
Sterling payment	€3.1m/1.155	£2,683,983
plus: Option premium cost		30,000
Sterling payment		£2,713,983
Money market hedge		
Euro invested now €3.1m/(1 + [6.9%/4]	= €3.1m/1.01725	€3,047,432
So Sterling payment, converted at spot rate	€3,047,432/1.145	£2,661,513
Sterling borrowed at [4.8%/4]	£2,661,513 × 1.012	£2,693,451
Forward contract		
Sterling payment: €3.1m/(1.145 + 0.008)	[(€3.1m/1.153) + £5,000]	£2,693,638

(iii) Considering the spot rate, if the euro weakens then this will benefit TawTorr. A 2.5% reduction in the value of the euro against Sterling will give a net payment of £2,640,545, whilst a stronger euro gives a Sterling equivalent of £2,777,778. The difference between these figures is quite considerable - £137,233.

So it might be wise to consider using the hedging instruments, but the directors' attitude to risk would influence that decision.

The money market hedge (MMH) and the forward contract (both of which give a fixed outcome) produce similar results, but the MMH is a better outcome (very marginal). The OTC option is less attractive, mainly because of the cost of the option premium. However if Sterling had strengthened sufficiently by 31 May it would be worth not exercising the option. The break-even exchange rate for this to occur would be €3.1m/[£2,693,638 - £30,000], i.e. €1.164/£. If the rate was above this then using the spot rate and ignoring the option would produce a lower Sterling payment than that for the MMH.

(b) As TawTorr wishes to hedge against the FTSE Index falling it would buy May 20X2 put option contracts at an exercise price of 4800.

$$\text{The number of contracts} = \frac{£3.6m}{(4{,}800 \times £10)} = 75 \text{ contracts}$$

	Portfolio and FTSE index falls		Portfolio and FTSE index rises
	£		£
Portfolio value @ 31/5/X2	3,450,000		3,675,000
Option exercised ([4800 – 4600] × 75 × £10)	150,000	Not exercised	0
	3,600,000		3,675,000
Cost of option (165 × 75 × £10)	(123,750)		(123,750)
	3,476,250		3,551,250
Current value of portfolio (29/2/X2)	3,600,000		3,600,000
Decrease in value of portfolio	123,750		48,750

30 DEEP DRILL SUPPLIES LTD

(a) (i) Possible spot rates at 30 September 20X2

9.230	× 10%	0.923	
9.330	× 10%	0.933	
9.430	× 40%	3.772	
9.530	× 40%	3.812	
Expected spot rate at 30 September 20X2 (NK/Tk)		9.440	

So Taka receipt if no hedging (i.e. spot rate at 30/9/X2)	16.75m NK	Tk1,774,364

9.440

(ii) *Forward contract*

Taka receipt:	16.75m NK / (9.325 + 0.13)	16.75m NK / 9.455		Tk1,771,549

(iii) *Money market hedge*

NK borrowed now	16.75m NK / (1 + 6.6%)	16.75m NK / 1.066	15,712,945 NK	
Taka receipt, converted at spot rate		15,712,945 NK / 9.325	Tk1,685,034	
Taka invested at 4.3% pa		Tk1,685,034 × (1 + 4.3%)		Tk1,757,490

(iv) *Option*

Put option (sell NK) exchange rate is		9.300 NK/Tk	
Taka receipt		16.75m NK / 9.300	1,801,075
less: Premium cost Tk25,000 × 1.043 (assumed on deposit)			(26,075)
Taka receipt - net			Tk1,775,000

(b) The directors' attitude to risk will be an important factor.

Taka receipt with current spot rate (9.325NK/Tk) (16.75m NK/9.325) Tk1,796,246

The forward contract (assuming that there is no arrangement fee) produces a higher Taka receipt than the money market hedge. Both of these hedging methods will produce a fixed Taka amount, known at the start of the hedging period.

If the research paid for is accurate then it would be better to not hedge at all as the spot rate in twelve months' time will produce a Taka receipt of Tk1,774,364. If the current spot rate remains constant (unlikely bearing in mind the comparative interest rates in the BANGLADESH and Norway) this would produce an even higher Taka receipt of Tk1,796,246. However, if the future spot rate is 9.53 (as per the question) the receipt is only Tk1,757,608 i.e. worse than the forward contract.

The put option at the strike price of 9.30NK/Tk produces an attractive amount of Tk1,775,000 and management might consider paying the Tk25,000 premium and also have the chance to benefit from a low exchange rate in September 20X2. At a future spot rate of 9.23 (as per the question) the option would be abandoned with a receipt of (Tk1,814,735 – 26,075) Tk1,788,660.

(c) (i) FRA – this would fix the rate of interest receivable by DDS. Upside potential is therefore removed. It can be tailored to the exact amount to be invested by DDS.

(ii) Interest rate future – DDS would buy interest rate futures, but these are for standardised amounts, which could be impractical.

(iii) Interest rate option – DDS would have the right to deal at an agreed interest rate at maturity date, i.e. March 20X2. DDS would buy traded call options, but these are for standardised amounts and may not be suitable. So, for more flexibility, DDS could purchase a tailored over the counter (OTC) option.

(iv) Interest rate swap – it would be impractical as a long term hedge for a large deposit. The hedge is only for six months. It would be difficult to find a counterparty.

Appendices

Formulae and Discount Tables

Formulae you may require:

a. Discounting an annuity

The annuity factor: $AF_{1 \rightarrow n} = \frac{1}{r}\left[1 - \frac{1}{(1+r)^n}\right]$

Where AF = annuity factor
n = number of payments
r = discount rate as a decimal

b. Gordon growth model: $k_e = \frac{D_0(1+g)}{P_0} + g$

Where k_e = cost of equity
D_0 = current dividend per ordinary share
g = the annual dividend growth rate
P_0 = the current ex-div price per ordinary share

c. Capital asset pricing model: $r_j = r_f + ß_j (r_m - r_f)$

Where r_j = the expected return from security j
r_f = the risk free rate
$ß_j$ = the beta of security j
r_m = the expected return on the market portfolio

d. $\beta_e = \beta_a \left(1 + \frac{D(1-T)}{E}\right)$

Where β_e = beta of equity in a geared firm
β_a = ungeared (asset) beta
D = market value of debt
E = market value of equity
T = corporation tax rate

Note: Candidates may use other versions of these formulae but should then define the symbols they use.

DISCOUNT TABLES

Interest rate p.a.	Number of years n	Present value of CU1 receivable at the end of n years	Present value of CU1 receivable at the end of each of n years
1%	1	0.990	0.990
	2	0.980	1.970
	3	0.971	2.941
	4	0.961	3.902
	5	0.951	4.853
	6	0.942	5.795
	7	0.933	6.728
	8	0.923	7.652
	9	0.914	8.566
	10	0.905	9.471
5%	1	0.952	0.952
	2	0.907	1.859
	3	0.864	2.723
	4	0.823	3.546
	5	0.784	4.329
	6	0.746	5.076
	7	0.711	5.786
	8	0.677	6.463
	9	0.645	7.108
	10	0.614	7.722
10%	1	0.909	0.909
	2	0.826	1.736
	3	0.751	2.487
	4	0.683	3.170
	5	0.621	3.791
	6	0.564	4.355
	7	0.513	4.868
	8	0.467	5.335
	9	0.424	5.759
	10	0.386	6.145
15%	1	0.870	0.870
	2	0.756	1.626
	3	0.658	2.283
	4	0.572	2.855
	5	0.497	3.352
	6	0.432	3.784
	7	0.376	4.160
	8	0.327	4.487
	9	0.284	4.772
	10	0.247	5.019
20%	1	0.833	0.833
	2	0.694	1.528
	3	0.579	2.106
	4	0.482	2.589
	5	0.402	2.991
	6	0.335	3.326
	7	0.279	3.605
	8	0.233	3.837
	9	0.194	4.031
	10	0.162	4.192

Notes

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Notes

REVIEW FORM – FINANCIAL MANAGEMENT STUDY MANUAL

Your ratings, comments and suggestions would be appreciated on the following areas of this Study Manual.

	Very useful	*Useful*	*Not useful*
Chapter Introductions	☐	☐	☐
Examination context	☐	☐	☐
Worked examples	☐	☐	☐
Interactive questions	☐	☐	☐
Quality of explanations	☐	☐	☐
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Self-test questions	☐	☐	☐
Self-test answers	☐	☐	☐
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