Course Notes

ACCA F9

Financial Management

Exams from September 2017

Tutor details

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where people count

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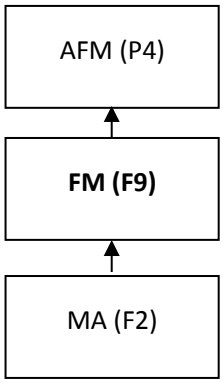
1 Links to other papers



1.1 Paper aim

To develop the knowledge and skills expected of a finance manager, in relation to investment, financing, and dividend policy decisions.

Main capabilities

On successful completion of this paper, candidates should be able to:

A Discuss the role and purpose of the financial management function
B Assess and discuss the impact of the economic environment on financial management
C Discuss and apply working capital management techniques
D Carry out effective investment appraisal
E Identify and evaluate alternative sources of business finance
F Discuss and apply principles of business and asset valuations
G Explain and apply risk management techniques in business

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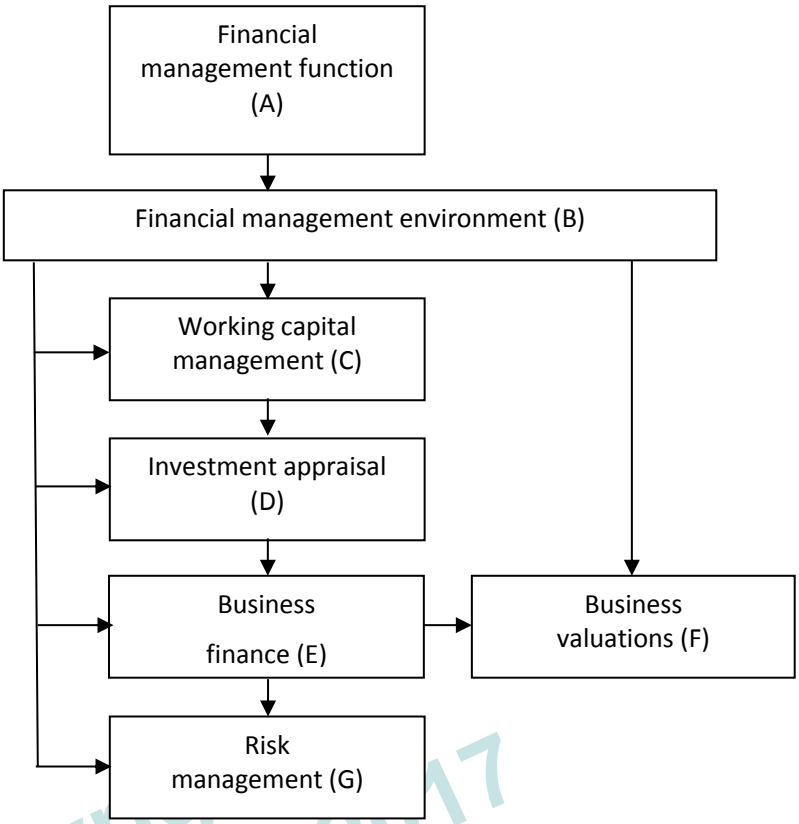
Relational diagram of main capabilities



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Rationale

The syllabus for Paper F9, *Financial Management*, is designed to equip candidates with the skills that would be expected from a finance manager responsible for the finance function of a business. The paper, therefore, starts by introducing the role and purpose of the financial management function within a business. Before looking at the three key financial management decisions of investing, financing, and dividend policy, the syllabus explores the economic environment in which such decisions are made.

The next section of the syllabus is the introduction of investing decisions. This is done in two stages - investment in (and the management of) working capital and the appraisal of long-term investments.

The next area introduced is financing decisions. This section of the syllabus starts by examining the various sources of business finance, including dividend policy and how much finance can be raised from within the business. It also looks at the cost of capital and other factors that influence the choice of the type of capital a business will raise. The principles underlying the valuation of business and financial assets, including the impact of cost of capital on the value of business is covered next.

The syllabus finishes with an introduction to, and examination of, risk and the main techniques employed in the management of such risk.

Approach to examining the syllabus

The syllabus for Paper F9 aims to develop the knowledge and skills expected of a finance manager who is responsible for the finance function of a business.

The paper also prepares candidates for more advanced and specialist study in Paper P4, *Advanced Financial Management.*

The syllabus is assessed by a three-hour 15 minutes paper-based examination. All questions are compulsory. It will contain both computational and discursive elements. Some questions will adopt a scenario/case study approach.

Section A of the exam comprises 15 multiple choice questions of 2 marks each.

Section B of the exam comprises three scenarios consisting of 15 multiple choice questions of 2 marks each.

Section C contains two 20 mark questions.

The two 20 mark questions will come from working capital management, investment appraisal and business finance areas of the syllabus. The section A and section B questions can cover any areas of the syllabus.

Candidates are provided with a formulae sheet and tables of discount and annuity factors.

2 Paper based or computer based exam?

Sessional computer based exams are available for papers F5 to F9. Until December 2017 these run alongside the traditional paper based exams and you may sit either. At the time of printing these Course Notes the ACCA had announced that they are hoping to phase out the paper exams from March 2018. If this happens you will then have to sit the CBE. If you are taking your exam from March 2018 onwards, please check the ACCA website for further detail www.accaglobal.com

The technical content of paper based and computer based exams is identical, but there is a slightly wider variety of question styles in the computer based exam.

You will find a variety of question styles in the companion Question Ban, so that you are prepared for the computer based exam as well as the paper one.

For more information on the computer based exam please see the ACCA website:

http://www.accaglobal.com/gb/en/student/exam-entry-and-administration/computer-based-exams.html

and

http://www.accaglobal.com/content/dam/ACCA_Global/Students/exam/Guide-to-CBEs-v3.pdf

The ACCA has produced a specimen exam which is available as both a paper specimen and as a computer based specimen. The paper version of the specimen exam is included at the back of this question bank. If you are sitting the computer based exam, it is VITAL that you work through the computer based specimen, which can be found at the following:

https://sampletds1.pearsonvue.com/Minerva/startDelivery?sessionUUID=1c817140-1132-4b98-9c2c-3954bf26fd2f

In addition, it is VITAL that you look at the extra constructed response questions and the constructed response workspace information provided at:

https://sampletds1.pearsonvue.com/Minerva/startDelivery?sessionUUID=5602afd4-1b9b-45be-9ea4-accb3dd39284

2.1 Examination technique

Time management

The paper is very time pressured. Students should keep track of their time carefully, and not 'over-run' on one question to the detriment of another.

Question requirements

Always read the question carefully.

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3 Study planner

Chapter	Subject	PER relevance	Time (min)	Questions from the First Intuition Question Bank
Introduction	This sets the background to the paper		10	
Formulae Sheet	In this paper you are supplied with formulae sheets, a copy of which is provided at the back of these Notes so that you can familiarise yourself in preparation for the real exam.		10	
1	**Financial Management Function** This is an introduction to the paper, but make sure you learn the ratios.		60 reading 110 questions	**SFQs**: 1-8 **Scenario Qs**: Q9-13 YNM Co
2	**Financial Management Environment** This is a brief written chapter showing the link between the outside world and financial management.	PO11	40 reading 85 questions	**SFQs**: 1-11
3	**Working Capital Management** This is an important chapter as it has appeared in every single real exam so far. It is not difficult, but it is worth going through it slowly to ensure that you understand it fully.	PO10	160 reading 360 questions	**SFQs**: 1-12 **Scenario Qs**: 13-17 FLG Co **LFQs**: 1 Plot Co, 2 Ulnad Co, 3 Ginboa Co, 4 HGR Co, 5 ZSE co
4	**Investment Appraisal** This is another important chapter as it has also appeared in every single real exam so far. It is slightly more technical in places. The NPV calculation is the central idea you MUST be happy with and the IRR is also important both here and in Chapter 6.	PO09	220 reading 450 questions	**SFQs**: 1-13 **Scenario Qs**: 14-18 Socan, 19-23 Trecor **LFQs**: 1 Darn Co, 2 HDW Co, 3 Riddulph Co, 4 BRT Co
5	**Business Finance** Sources of finance is a mostly written part of the syllabus, though the Examiner does like you to be able to calculate the theoretical ex rights price. Cost of capital is another important part of the syllabus, having been examined in all but one of the real exams so far. The whole chapter is important and if you are happy with it the following chapter is much easier.	PO09, PO11	220 reading 500 questions	**SFQs**: 1-12 **Scenario Qs**: 13-17 Amah Co **LFQs**: 1 Card Co, 2 Rochie Co, 3 Burse Co, 4 Spot Co, 5 Nugfer Co, 6 Maratona Co, 7 Zigto Co, 8 Clozer Co

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Chapter	Subject	PER relevance	Time (min)	Questions from the First Intuition Question Bank
6	**Business Valuations** In this chapter we are given the cost of capital and have to calculate the value, which is the reverse of the previous chapter.	PO09	80 reading 250 questions	**SFQs**: 1-9 **Scenario Qs**: 10-14 Close Co, 15-19 Gemlo Co **LFQs**: 1 Quasa Co, 2 THP Co
7	**Risk Management** This final chapter is a mix of discussion and calculation covering the two main risks faced by most businesses; namely foreign currency and interest rates.	PO11	80 reading 240 questions	**SFQs**: 1-11 **Scenario Qs**: 12-16 PZK Co **LFQs**: 1 Birne Co

The chapter number refers to the chapter of these Course Notes. The time is a guide as to how long you should spend reading the relevant chapter and how long it will take to attempt and review the solutions for the recommended questions.

3.1 Practical Experience Requirements (PER) and Performance Objectives

ACCA requires students to have 36 months' practical experience in order to become members. Part of the practical experience requirements is achieving performance objectives that demonstrate that you can apply what you've learnt when studying to real-life, work activities.

ACCA has set out 20 performance objectives in 9 areas. You are required to achieve 9 performance objectives – all 5 Essentials performance objectives and any 4 Technical performance objectives. ACCA has provided guidance on which objectives are strongly linked to which exam. The relevant objectives for F9, which are 1 Essential and 3 Technical objectives, are:

(1) Professionalism and ethics (relevant for all exams)

(9) Evaluate investment and financing decisions (relevant for F9, P3 and P4)

(10) Manage and control working capital (relevant for F9 only)

(11) Identify and manage financial risk (relevant for F9, P1 and P4)

You can find further guidance on Practical Experience Requirements and performance objectives at:

http://www.accaglobal.com/uk/en/student/practical-experience.html

Further guidance and resources to support your studies from the ACCA may be found at:

http://www.accaglobal.com/us/en/student/exam-support-resources.html

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1

Financial management function

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1 The nature and purpose of financial management

1.1 Financial management

Financial management involves identifying the **financial objectives** of an organisation and then ensuring that these are achieved.

In order to achieve the financial objectives set out by an organisation the financial managers within the organisation have to make effective decisions in three key areas:

- **Investment** (covered in Chapters 3 and 4)
- **Financing** (covered in Chapter 5)
- **Dividend** (covered in Chapter 6)

These decisions form the **Financial Strategy** of the organisation).

Examples of interdependence of the three key decision areas:

- Companies raise capital either in the form of equity or debt (the financing decision) which they invest in different projects (the investment decision) in order to generate returns which are either reinvested or paid out to the shareholders (the dividend decision).
- If a company increases its dividends (the dividend decision), this will reduce the level of retained cash and increase the need for external finance (the financing decision) in order to fund capital investment projects (the investment decision).
- An increase in capital investment expenditure (the investment decision) would also increase the need for finance (the financing decision) which may be internally generated by reducing dividends (the dividend decision).

1.2 Financial and management accounting

Financial accounting is used to report on the past performance of an organisation and so allows stakeholders to see how successful the financial management has been historically.

Management accounting provides both current and forecast information which is used by financial managers to help them achieve the financial objectives. Management accountants are involved in three different activities:

- **Planning:** Identifying where the business would like to be, at some future point, by setting objectives or targets (financial targets are known as budgets).
- **Decision-making:** Making decisions to get the business from where it is now, to where it wants to be i.e. deciding how to achieve the plan. Decisions on products and markets are **key in this respect.**
- **Control:** Ensuring the decisions are implemented correctly and that the plan is actually fulfilled.

2 Financial objectives and the relationship with corporate strategy

2.1 Financial objectives, corporate objectives and corporate strategy

Corporate objectives are the targets that need to be met in order for the business to be successful in achieving its overall mission and goal(s). These objectives cover the whole organisation and include:

- **Commercial objectives** (e.g. market share, growth, customer satisfaction)
- **Financial objectives** (objectives which can be expressed in financial terms - see below).

Corporate strategy is the course of action required to achieve the corporate objectives and includes key business decisions such as how the business will grow (organic vs. acquisition) and in which markets to operate.

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2.2 Identify and describe a variety of financial objectives

2.2.1 Shareholder wealth maximisation

As a general rule the prime financial objective of profit making organisations is to maximise shareholder wealth. Wealth is delivered to shareholders through the payment of **dividends** and the increase in **share price**. So this combination needs to be maximised.

2.2.2 Profit maximisation

Applying shareholder wealth maximisation to internal decisions can be difficult and consequently it is not uncommon for organisations to follow an objective of profit maximisation. As long as this is long term profit maximisation, it should be consistent with shareholder wealth maximisation.

2.2.3 Earnings per share growth

It can be very difficult to judge whether a company has maximised its shareholders' wealth or maximised its long-term profitability, so the word 'maximised' will often be replaced with the word 'increased'. One way of judging whether there has been an increase is to see if earnings per share have grown. These earnings can either be used to pay a dividend or to reinvest to create capital growth.

3 Stakeholders and impact on corporate objectives

3.1 Measuring achievement of corporate objectives (ratio analysis)

The achievement of financial objectives can be judged using ratio analysis. Ideally the calculated ratios for the business in question should be compared to either historic ratios or industry averages.

Definitions:

- PBIT = Profit before interest & tax, PAT = Profit after tax and preference dividends (also known as 'earnings')
- TALCL = Total assets less current liabilities
- Shareholder funds = Ordinary share capital + Share premium + Reserves

3.1.1 Financial performance ratios

Ratio	Calculation	Description & Notes
Return on Capital Employed (ROCE)	$\frac{\text{PBIT}}{\text{TALCL}}$	Measures efficiency in generating profits from all capital employed (by both lenders + shareholders)
Return on Shareholder Funds	$\frac{\text{PAT}}{\text{Shareholder Funds}}$	Measures efficiency in generating earnings for shareholders from capital they have contributed
Gross Profit Margin	$\frac{\text{Gross Profit}}{\text{Revenue}}$	Measures our ability to sell goods for more than they cost to make
Net Profit Margin	$\frac{\text{PBIT}}{\text{Revenue}}$	Measures our ability to make an overall profit on goods sold
Growth in Revenue, PBIT, PAT	Year on year, or geometric growth	To what extent is turnover growth leading to profit growth? How good is cost control?

3.1.2 Shareholder ratios

Ratio	Calculation	Description & Notes
Total Shareholder Return	$\frac{\text{Divi} + \text{change in price}}{\text{Price at start of year}}$	Measures the total return on investment (based on income and capital growth) for shareholders
Dividend Yield	$\frac{\text{Dividends per share}}{\text{Share Price}}$	If you purchased a share today, what % income return would you expect on your investment?
Earnings per share (EPS)	$\frac{\text{PAT}}{\text{Number of shares}}$	The amount of earnings the company has generated for the shareholders on each share they hold.
P/E Ratio	$\frac{\text{Share Price}}{\text{EPS}}$	What is the market's view of our future growth? A high P/E ratio suggests high predicted growth
Growth in EPS, DPS, share price	Year on year, or geometric growth	To what extent is earnings growth leading to dividend growth? How does this compare to share price moves?

3.1.3 Financial position ratios

Ratio	Calculation	Description & Notes
Debt:Equity Ratio	$\frac{\text{Long term debt}}{\text{Equity}}$	What proportion of assets are funded by lenders vs shareholders (use market values if available)
Gearing	$\frac{\text{Long term debt}}{\text{Equity} + \text{long term debt}}$	What proportion of assets are funded by lenders vs shareholders (use market values if available)
Interest Cover	$\frac{\text{PBIT}}{\text{Interest payable}}$	How many times could the annual interest bill be paid with profits before interest and tax
Operational Gearing	$\frac{\text{Contribution}}{\text{PBIT}}$ or $\frac{\text{Fixed Costs}}{\text{Total Costs}}$	To what extent are our costs fixed vs. variable?

LECTURE EXAMPLE 1.1

The following financial data is available for Diamond Co which has issued 2.1 million shares which are currently priced at $7.20 per share (they were priced at $7 at the end of the prior year).

Extracts from the financial statements:

	$000
Income statement	
Revenue	14,687
Profit from operations before interest and tax	2,159
Profit from operations after interest and tax	1,260
Dividends	525
Statement of financial position	
Non-current assets	7,340
Current assets	3,562
Current liabilities	3,070
Long-term liabilities	2,876
Shareholders' funds	4,956
Industry average figures	
ROCE	27.5%
Return on Equity	25.5%
EPS	$0.42
Dividend per share	$0.15

Calculate the ROCE, Return on Equity, EPS, Dividend per Share, P/E ratio and total shareholder return for Diamond Co and comment on your figures.

SOLUTION

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ROCE		
Return on Equity		
EPS		
Dividend per share		
P/E ratio		

TSR		

3.2 Stakeholders and their objectives

A stakeholder is an individual or group of individuals with an interest in the organisation.

Stakeholder	Objectives
Shareholder	Share price maximisation, dividend maximisation, earnings growth, maintenance of control
Lenders	Certainty of payment, security of capital, further loans
Directors/Senior managers	Maximise remuneration, Security of tenure, maximisation of power and influence
Employees	Maximise remuneration, security of tenure, career development , training
Customers	VFM, high quality, reliable service, innovation
Suppliers	Certainty of payment, further business
Government	Creation of employment, payment of taxes
Community	Environmental improvements, creation of wealth

3.3 Possible conflicts between stakeholder objectives

As can be seen in in the table above, different stakeholders will have different objectives and some of these may not be consistent, for example:

- Maximising the dividend and maximising directors' remuneration; the more the directors are paid, the less that is left to pay out a dividend

3.4 Discuss the role of management in meeting stakeholder objectives, including the application of agency theory

It is the manager's role to balance the objectives of the different stakeholders and where there are conflicts, deciding upon which objective should take priority.

- The shareholders are the owners of a company, however the owners do not also have to be the managers and so they appoint directors (who can also be shareholders) to manage the company for them.
- In legal terms the directors are the shareholders' agents and an agent should always act in the best interests of their principals i.e. the shareholders.

Agency theory says the directors will always put the shareholders' objectives first. That is not to say the directors will ignore all other stakeholders' objectives as if the remaining stakeholders are unhappy, then it will be difficult to maximise shareholder wealth.

The Agency Problem refers to the situation where the directors may be tempted to act in their own best interests rather than the shareholders.

The agency problem may be addressed by using a mixture of appropriate managerial reward schemes corporate governance.

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3.5 How to encourage the achievement of stakeholder objectives

3.5.1 Managerial reward schemes such as share options and performance-related pay

Directors can be encouraged to act in the best interests of shareholders if their objectives are aligned with those of the shareholders.

This can be achieved by rewarding them partly in share options in the company. Hence, if the share price of the company rises over the long term, the value of the options will increase (and this should encourage the directors to target long term growth and performance).

Alternatively, the director's remuneration can be linked to the increase in the company's share price, profits or earnings.

However, both of these approaches may still lead to poor performance being rewarded (as the move in share price may not be due to the actions of the directors).

3.5.2 Regulatory requirements such as corporate governance codes of best practice and stock exchange listing regulations

In the UK the UK Corporate Governance Code (September 2012) sets out what is accepted as best practice as to the ways in which directors should behave in running a company. All listed companies must make a statement on the appliance and compliance of the Code when they publish their financial statements.

The Code recommends certain measures to curb the power of the executive directors, such as the appointment of non-executive directors and nomination and remuneration committees.

The Stock Exchange Listing Regulations contain the eligibility criteria for listing, the duties of sponsors and continuing obligations of listed companies. These regulations apply to all companies listed on the Main Market, but are particularly pertinent to those obtaining a listing for the first time.

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4 Financial and other objectives in not-for-profit organisations

4.1 The impact of not-for-profit status on financial and other objectives

Not-for-profit organisations (e.g. government departments, schools, charities) tend not to have shareholders and consequently lose the objective of maximising shareholder wealth. As a result, financial objectives change and become less important, with non-financial objectives becoming key.

4.2 The importance of Value for Money in not-for-profit organisations

The most common way of measuring performance in not-for-profit organisations is to identify whether they are offering value for money (VFM). The National Audit Office (NAO) assesses VFM according to three criteria:

(a) Economy – cost of resources used
(b) Efficiency – outputs vs. inputs
(c) Effectiveness – achieving targets

4.3 Measuring the achievement of objectives in not-for-profit organisations

The achievement of objectives in not-for-profit organisations can be measured by:

- Comparing actual performance to non-financial targets
- Questioning users
- Appointing regulators/experts to monitor performance
- Comparing actual performance to appropriate financial targets

2

Financial management environment

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1 The economic environment for business

1.1 The main macroeconomic policy targets

Different governments will put a different emphasis on individual policies and use different measures to achieve these policies, but in general governments try to achieve the following macroeconomic targets:

- Strengthening business to make the economy more competitive
- Protecting the environment
- Increasing employment opportunities
- Ensuring fairness for families and communities
- Delivering macroeconomic stability to encourage long term planning and investment

1.2 Fiscal, monetary, interest rate and exchange rate policies

Fiscal policy determines how Governments raise and spend money:

- Taxation and Government spending affect the amount that companies and individuals have available for spending and hence impact on demand and output
- Hence increasing taxation levels or decreasing public expenditure should decrease demand and output.

Monetary policy is used by Governments to regulate the supply of money:

- The broad aim of monetary policy is to achieve price stability by influencing the level of demand in the economy
- One aspect of monetary policy is **interest rate policy**, where central banks change interest rates to change the price of and hence demand for money

- Central banks can also increase the supply of money by repurchasing Government debt from banks (known as **quantitative easing**)
- Increasing the supply of money (by reducing interest rates or quantitative easing) should make borrowing cheaper and hence increase demand

Exchange rate policy describes Government's attempts to influence exchange rates:

- Current policy in the UK is to allow a free or floating exchange rate (where demand and supply is allowed to set the exchange rate)
- Alternatives include managed and fixed exchange rate policies.
- However, exchange rates are one of the factors taken into account by the Bank of England when setting interest rates.
- A higher exchange rate (1 unit of domestic currency buys a large quantity of a foreign currency) will make imports and costs of production cheaper (hence leading to a reduction in inflation) and make exports more expensive (reducing demand for exports)

1.3 Interaction between government policies and planning and decision-making in business

1.3.1 Economic policy

When a business plans and makes decisions it may need to take into account the following factors:

- Demand levels
- Cost of capital
- Inflation of costs and revenues
- Exchange rates if importing or exporting or competing with those that do

Government economic policy affects all of the above and so interacts with planning and decision-making in business.

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1.3.2 Competition policy

- Without a competition policy which prevents anti-competitive behaviour such as price fixing, and market dominance; business could abuse its power and consumers would suffer.
- Thus when business is making plans especially for things such as mergers and takeovers, but also with regards to general competition it will be influenced by relevant competition policy.

1.3.3 Government assistance for business

- Governments may wish to encourage certain behaviour such as organic food production or the provision of social housing. Without some sort of assistance it may not be economical for business to change behaviour.
- Thus by offering assistance government (e.g. tax breaks or grants) can make the business decision attractive.

1.3.4 Green policies

- Green policies benefit society as a whole and are only effective if followed by virtually everyone; however they tend to also have an economic cost. Therefore, unless encouraged by government, individual businesses are unlikely to follow such policies.
- The Carbon Trading Scheme encourages businesses to plan ways of reducing their CO_2 emissions.

1.3.5 Corporate governance regulation

- Without corporate governance regulation, it would be left to the personal morality of each director to decide on what is and what is not acceptable. As a result of competition this would in turn lead to the lowest standard being adopted by everyone.
- The Companies Act dictates that directors must, for example, promote the success of the company for the benefit of its members, act within their powers and exercise independence, reasonable care, skill and diligence.
- If directors do not follow the Companies Act they can be barred from being a director or even sent to prison. Consequently, most directors abide by the Act when planning and making decisions.

2 The nature and role of financial markets and institutions

2.1 Identify the nature and role of money and capital markets, both nationally and internationally

- The **money markets** are short term (less than 12 months) interest rate markets for investing and borrowing. Such markets exist all around the world e.g. London, New York and Tokyo. These markets enable borrowers and lenders to manage their working capital efficiently.
- The **capital markets** are long term (more than 12 months) debt and equity markets. Such markets also exist all around the world e.g. London, New York and Tokyo. These markets enable companies to manage their capital structure efficiently.
- Both Money and Capital markets consist of a **primary market** through which initial issues take place and a **secondary market** where the securities are traded once they have been issued.

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2.1.1 Money market instruments

Instrument	Description	Term	Return
Money Market Accounts	A deposit account at a bank where the balance is invested in the money markets (short-term inter-bank borrowing markets).	Overnight - 12 months	Variable
Certificates of Deposit	A time deposit with a bank (≥$100k)	3 months - 5 years	Fixed rate
Repo (sale & repurchase agreement)	Short term loan secured on specific assets (lender actually takes possession of secured assets)	Usually < 1 year	Fixed rate
Treasury Bills	Short-term securities issued by Governments at a discount (sold in denominations of $1k)	1 / 3 / 6 month	Redeem at par, so effectively a fixed rate
Commercial Paper	Short-term debt issued by companies / banks (usually issued at a discount)	Usually < 270 days	Redeem at par, so effectively a fixed rate
Eurocurrency Market (International Money Market)	Short - medium term deposits / loans (often bank - bank) in currencies of countries other than that of the bank (e.g. USD deposit at bank in London) Most money market instruments are available on the Eurocurrency market (though typically only in major currencies)		

2.1.2 Describe the role of the money markets

Providing short-term liquidity to industry and the public sector

The money market consists of financial institutions and dealers in money or credit who wish to either borrow or lend. Participants borrow and lend for short periods of time, typically up to thirteen months. Thus the money markets are a source of short-term finance.

Providing short-term trade finance

Short-term trade finance can take the form of loans which normally can be sourced from a bank, but an organisation can also use the money markets.

Allowing an organisation to manage its exposure to foreign currency risk and interest rate risk

One way an organisation can manage its exposure to foreign currency risk is by using a money market hedge (Chapter 7), which involves short term lending and borrowing which is facilitated by the money markets. An organisation can also manage its exposure to foreign currency risk and interest rate risk is by using derivatives (Chapter 7), which also involves short term lending and borrowing which is facilitated by the money markets.

2.1.3 Capital market instruments

Instrument	Description	Term	Return
Corporate Bonds	Longer-term debt issued by companies / banks (usually issued at par)	Any (but often 3-10 years)	Fixed rate coupon, with redemption at maturity
Government Bonds	Longer-term debt issued by governments (usually issued at par)	Any	Fixed rate coupon, with redemption at maturity
Ordinary Shares	Shares issued by companies with no term. Returns for shareholders comprise: Dividends (dependent on the performance of the company, not guaranteed). Capital growth (shares may rise in value based on performance of the company)		
Eurobond Market	Longer term debt (bonds) issued to investors (probably international) and denominated in a currency other than the domestic currency of the issuer Often issued via investment banks, normally in the major currencies (USD, EUR, CHF, GBP)		

2.2 The functions of a stock market and a corporate bond market

The functions of a stock market are as follows:

- To enable companies to raise new finance
- To enable existing investors to sell their investments
- To aid takeovers by issuing shares to finance the takeover
- To enable private company shareholders to realise part/all of their investment by floating the company

The functions of a corporate bond market are as follows:

- To enable companies to disintermediate i.e. to deal directly with lenders
- To enable companies to raise new debt finance
- To enable existing debt investors to sell their debt
- To aid takeovers by issuing debt to finance the takeover

2.3 Nature of different securities and risk vs. return

Investors require compensation for the risks they are exposed to by their investment. Hence, the greater the risks run by the investor, the greater the return they require.

This is demonstrated by the most common types of securities:

- **Ordinary shares** – these are the owners of the company, however they stand last in the queue and are only paid (a dividend) once all other debts have been settled and so they face the highest risk and would consequently expect the highest return in the long term.
- **Preference shares** – these tend not to have any voting rights despite being shareholders. Their dividend is normally fixed and has to be paid as long as the company has the money to do so. Thus they do not face as much risk as the ordinary shareholders and so their dividend is lower on average.
- **Unsecured debt** – this is paid interest and if the company is unable to pay, then the unsecured debt holders can have the company wound up, however there is no guarantee that they will recover all of their capital as they rank equally with all other creditors.
- **Secured debt** – this is also paid interest and if the company is unable to pay, then the secured debt holders can realise their security and if they are still owed money can have the company wound up, thus they are all but certain to recover all of their capital. Hence they face the least risk and receive the lowest return of all securities.

2.4 Explain the role of banks and other financial institutions in the operation of the money markets

Banks and other financial institutions form the core of the money market as the vast majority of transactions consist of interbank lending where banks borrow and lend to each other.

2.5 Explain the role of financial intermediaries

Financial intermediaries such as banks and city institutions, link lenders with borrowers. There are a number of advantages of using financial intermediaries compared to lenders and borrowers dealing directly with one another. These are:

- **S**ecurity. Intermediaries will generally be able to guarantee the security of the lenders' and borrowers' positions.
- **C**onvenience. The lender does not need to directly find an appropriate borrower.
- **A**ggregation. An intermediary can take small amounts from investors and lend on in larger packages. This is a significant benefit as lenders and borrowers do not need to find people who want to deal with exactly the same amounts as them.
- **M**aturity transformation. The intermediary can provide investors and borrowers with instruments that match their desired timescales. For example, investors may want to invest for the short term but borrowers may wish for a longer term source of finance.
- **S**ource of funds. A borrower will normally be able to find an intermediary who is prepared to provide them with some funds even if the general market conditions are not that favourable.

Disintermediation arises where borrowers deal directly with lending individuals.

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3

Working capital management

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1 The nature, elements and importance of working capital

1.1 The nature of working capital and its elements

Working capital is the cash invested in current assets less current liabilities. Current assets will consist of inventories (raw materials, work in progress and finished goods), receivables and cash. Current liabilities will consist of trade and other payables, short term loans and overdrafts.

1.2 The objectives of working capital management (liquidity vs. profitability)

- The **liquidity objective of working capital management** is to ensure that the organisation always has sufficient cash to pay its liabilities as they become due.
- The **profitability objective of working capital management** is to ensure that the organisation is as efficient as possible by, amongst other things, ensuring all capital is invested to earn the maximum return.
- The greater the liquidity of an organisation, the more cash it will have which is not invested and thus the profitability will be lower. The greater the profitability of an organisation, the more cash it will have which is invested and thus the liquidity will be reduced.

	Aggressive WC Policy	Conservative WC Policy
Policy	Maintain a low level of working capital	Maintain a high level of working capital
Result	**Higher profit** (due to greater investment of cash), but **lower liquidity** and **higher risk** due to lower cash and inventory balances (hence more chance of running out of cash / inventory).	**Lower profit** (due to more cash being tied up in working capital, earning no return), but **higher liquidity** and **lower risk** due to higher cash and inventory balances.

1.3 Discuss the central role of working capital management in financial management

- If working capital is not managed correctly the outcome is terminal.
- If an organisation is **too liquid**, it will have large amounts of cash which are not invested in business assets and thus the profitability will suffer. An inefficient business will eventually fail or be taken over at a low price.
- If an organisation is **illiquid**, it will be unable to meet its liabilities and will fail. When a business is growing its profits will increase, but it will also require more capital to pay for the increased levels of working capital. If this extra capital is not raised in time, the business will become illiquid.
- This situation is commonly referred to as **'overtrading'** as the growth in trade is what necessitated the extra capital, which if not raised leads to the business failing.
- It is also appropriate to describe this situation as **'undercapitalisation'** as it is the lack of capital which causes the business to be unable to meet its liabilities as they fall due.
    - Overtrading could thus be indicated by:
        - A rapid increase in turnover
        - An increase in inventory days
        - An increase in receivables days
        - An over reliance on short-term sources of finance, including overdraft, trade payables and leasing
        - A decreases in the current ratio
        - A decrease in the quick ratio
        - A decrease in profit caused by selling more at low prices

Note: The measures (e.g. receivables days) mentioned above are covered in section 2 below.

Both 'overtrading' and 'undercapitalisation' are opposite sides of the same coin and the financial manager should always ensure that any project undertaken by an organisation (such as a growth in sales) is beneficial to the shareholders and that the appropriate funding is also available.

Thus the successful management of working capital is central to a company achieving its financial objectives.

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1.4 The cash operating cycle and the role of accounts payable / receivable

The cash operating cycle is the time difference between cash being paid out for production costs and cash being received for goods sold. This can be calculated as follows:

	Days
Average time raw materials are in stock	X
Average time work in progress is in production	X
Average time finished goods are in stock	X
Average collection period	X
Less: (Average payable period)	(X)
Cash operating cycle	X

Thus the cash operating cycle will become smaller either as accounts payable increase and/or as accounts receivable reduce.

1.5 Explain and apply relevant accounting ratios

1.5.1 Current ratio and quick ratio

$$\text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}}$$

- This ratio looks at the liquidity of the organisation and assesses its ability to meet its short term debts. There is no correct minimum or maximum level for this ratio and you need to consider the type of business, its historic position and the ratio of its competitors.

$$\text{Quick ratio (acid test)} = \frac{\text{Current assets} - \text{inventory}}{\text{Current liabilities}}$$

- This is sometimes considered a better measure of an organisations liquidity especially where inventory cannot be turned into cash very quickly.

1.5.2 Inventory turnover ratio, average collection period and average payable period

$$\text{Inventory turnover ratio} = \frac{\text{Cost of sales}}{\text{Average inventory}}$$

- This ratio looks at how many times the inventory is used each year. Year-end inventory can also be used to measure this ratio.
- A higher ratio indicates a more efficient management of inventory, however the relatively low levels of inventory could also increase the risk of stock-outs, which could damage an organisations reputation. It may also discourage customers from trading with the organisation as there could be a lack of choice or a delay in receiving delivery.
- By inverting this ratio and multiplying by 365 it is possible to calculate the inventory days as follows

$$\text{Average inventory period} = \frac{\text{Average inventory}}{\text{Cost of sales}} \times 365 \text{ days}$$

- This ratio looks at the average time inventory stays in the warehouse. Again year-end inventory can also be used. A short period has the same implications as a high inventory turnover ratio.

$$\text{Average collection period} = \frac{\text{Average trade receivables}}{\text{Credit sales turnover}} \times 365 \text{ days}$$

- This ratio looks at the average time it takes to collect money from customers. Again year end trade receivables can also be used. A short period is good for liquidity but may discourage customers from trading with the organisation.

$$\text{Average payable period} = \frac{\text{Average trade payables}}{\text{Credit purchases or cost of sales}} \times 365 \text{ days}$$

- This ratio looks at the average time it takes to pay money to suppliers. Again year end trade payables can also be used. A long period is good for liquidity but may discourage suppliers from trading with the organisation.

1.5.3 Sales revenue/net working capital ratio

$$\text{Sales revenue/net working capital ratio} = \frac{\text{Sales revenue}}{\text{Net working capital}}$$

- This ratio looks at the overall working capital of the organisation compared to its sales. It is very difficult to compare absolute levels of working capital as even organisations involved in the same business will vary in size.
- This ratio allows the overall working capital efficiency management to be compared, both over time and against competitors. If this ratio is low, this would suggest inefficiency, however if it is high the organisation may be losing business due to being too tough with customers.

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LECTURE EXAMPLE 3.1

The following financial data is available for Diamond Co.

Extracts from the financial statements:

	$000
Income statement	
Revenue	14,687
Gross profit	4,386
Profit from operations	2,159
Statement of Financial Position	
Non-current assets	7,340
Inventory	936
Trade receivables	2,626
Trade payables	1,296
Other payables	537
Overdraft	1,237
Net current assets	492

Calculate the current ratio, quick ratio, inventory turnover ratio, average collection period, average payable period and sales revenue/net working capital ratio for Diamond Co.

SOLUTION

Current ratio		
Quick ratio		
Inventory turnover ratio		
Average collection period		
Average payable period		
Sales revenue/net working capital ratio		

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2 Techniques for managing inventory

2.1 Economic order quantity (EOQ)

- The **Economic Order Quantity (EOQ)** model identifies the optimal order quantity in order to minimise the total annual inventory costs.
- This model assumes:
  - A constant demand
  - A zero or constant lead (delivery) time.
- The EOQ can be calculated by using the following formula:

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$$EOQ = \sqrt{\frac{2C_0D}{C_h}}$$

Where

C_o = **C**ost of placing one **o**rder
D = **D**emand per annum
C_h = **C**ost of **h**olding one unit for one year

And the total annual cost (TAC) is:

Annual order cost + Annual holding cost

$$TAC = C_o\frac{D}{Q} + C_h\frac{Q}{2}$$

Where

Q = Reorder quantity (EOQ)

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LECTURE EXAMPLE 3.2

Paton Co uses components at the rate of 500 units per month, which are bought in at a cost of $1.20 each from the supplier. It costs $20 each time an order is placed, regardless of the quantity ordered.

The total holding cost is 20% per annum of the value of stock held.

What are the EOQ and TAC?

SOLUTION

- The EOQ model assumes both constant known levels of demand and lead times, which are unlikely in practice.
- One way of overcoming this issue is to hold a **buffer stock** (so if the level of demand is higher than expected or the lead time longer, the buffer can be used and stock-outs will be avoided)
- On average the buffer stock will not be used and so the inventory levels are simply increased by the quantity of buffer stock and so are the holding costs. The level of buffer stock needs to be balanced against the cost of stock-outs.
- If a buffer stock of B units is held, the total annual inventory cost will be

$$TAC = C_o\frac{D}{Q} + C_h\left(B + \frac{Q}{2}\right)$$

2.1.1 EOQ and bulk discounts

Sometimes a supplier will offer a **bulk discount** if a certain quantity of inventory is ordered.

To calculate the best order quantity if a discount is offered:

(1) Calculate the EOQ ignoring the discounts.

(2) If the EOQ is above the first discount point recalculate the EOQ allowing for the discount

(3) Then calculate the total annual cost (**including the total purchase cost**) at the new EOQ and all discount points above the EOQ: $TAC = C_o\frac{D}{Q} + C_h\frac{Q}{2} + DP$ (where each unit costs \$P)

(4) The point at which the total annual cost is lowest is the best order quantity.

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LECTURE EXAMPLE 3.2 REVISITED

Paton Co has now been offered a 0.5% discount if it orders at least 1,500 units at a time.

How many units should Paton order?

SOLUTION

The EOQ model uses relevant costing principles and so ignores committed costs such as the fixed costs associated with the warehouse. However, if inventory is removed completely, then these costs also become relevant and so there is potential for significant savings.

2.2 Just-In-Time purchasing & production

- **Just-in-Time (JIT) production** helps to reduce inventory levels to their absolute minimum by only producing an item when a customer requires it (hence eliminating finished goods stocks and minimising work-in-progress stocks).
- **JIT Purchasing** helps to reduce inventory levels to their absolute minimum by only taking delivery of raw materials when required for production (hence eliminating raw material stocks).
- This requires a close working relationship with (local) suppliers, a quick production process and flexible staff.

Advantages of JIT	Disadvantages of JIT
Reduced holding costs	Increased risk of stock-out
Increased flexibility	Less opportunity for bulk discounts
Increased quality and efficiency	Low staff morale due to unpredictable production schedule
Closer relationships with suppliers and increased price transparency	Not appropriate for all organisations (e.g. NHS!)

3 Techniques for managing accounts receivable

The main advantage of offering credit is that you may sell more and hence make more profit. However, this also worsens the liquidity of the organisation and if the debt went bad, could result in no benefit what so ever from the sale. This is a significant drawback and can be dealt with as follows.

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3.1 Assessing creditworthiness

Before credit is offered to a new customer their creditworthiness needs to be assessed to give confidence that they will meet their debts as and when they fall due. There is no single correct way of assessing credit worthiness, but common elements include obtaining:

- A bank reference
- At least one trade references
- A credit rating agency report
- Financial statements
- Any media coverage
- Views of a member of staff who has visited the potential customer

3.2 Managing accounts receivable

Accounts receivable need to be managed by ensuring:

- Invoices and statements are issued on time
- The credit limit is not exceeded and is reviewed regularly
- The on-going financial performance is kept under review

3.3 Collecting amounts owing

It is essential to ensure that amounts owing are collected when due. This will include the following:

- Ensuring any queries are investigated promptly
- The account is put on hold if any amounts are overdue
- Legal action is taken (when necessary) to recover the funds

3.4 Offering early settlement discounts

One way of encouraging credit customers to pay earlier is to offer early settlement discounts. It is important to ensure that the benefits of such schemes outweigh the costs.

To determine whether the discount will be financially beneficial:

- Consider the cost of financing accounts receivable before and after the discount
- Treat the accounts receivable balance like a permanently overdrawn balance

LECTURE EXAMPLE 3.3

Early Bird Co currently has annual credit sales of $4,450,000. On average trade receivables take 55 days to pay and 8% of credit sales go bad. Early Bird is considering introducing an early settlement discount whereby all customers who pay in less than 30 days will receive a 5% discount. It is expected that 80% of customers will take advantage of the scheme and that bad debts will fall to 5%. The average trade receivables are expected to fall to 30 days. Early Bird currently pays 12% pa on its overdraft.

Is the proposed early settlement discount scheme economically viable for Early Bird Co?

SOLUTION

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3.5 Factoring and invoice discounting

Factoring is an arrangement to have debts collected by a factor company, which advances a proportion of the money it is due to collect.

- This is usually up to 80% of the face value of invoices raised - the finance is repaid once the invoices have been settled and the balance is passed to the issuing company after deduction of a fee. This fee is equivalent to an interest charge on the cash advanced.
- Factoring usually involves administration of the client's invoicing, sales accounting and debt collection service and credit protection for the client's debts, whereby the factor takes over the risk of loss from bad debts and so 'insures' the client against such losses. This is known as a **non-recourse** service.
- However, if a non-recourse service is provided the factor, not the firm, will decide what action to take against non-payers.

Invoice discounting is the purchase of trade debts at a discount (effectively a loan to the company secured on specific receivables).

- Invoice discounting enables the company from which the debts are purchased to raise working capital.
- The invoice discounter does not take over the administration of the client's sales ledger. A client should only want to have some invoices discounted when he has a temporary cash shortage, and so invoice discounting tends to consist of one-off deals.

3.6 Managing foreign accounts receivable

Managing foreign accounts receivable is the same as managing home accounts receivable but three points in particular need to be borne in mind:

(1) **Credit periods** tend to be longer due to the extra time taken for goods to be physically transported and the extra associated paperwork. These delays in foreign trade mean that exporters often build up large investments in inventories and accounts receivable. These working capital investments have to be financed somehow.

(2) **The bad debt risk** is generally higher and so the credit worthiness checks become even more important. If a foreign customer refuses to pay a debt, the exporter must pursue the debt in the debtor's own country, where procedures will be subject to the laws of that country.

(3) If the debts are denoted in a foreign currency, their value will vary as the **exchange rates** vary. Potential solutions to this problem are covered in Chapter 7.

The first two issues above can be managed and reduced as follows:

Reduced credit terms

- A company can reduce its investment in foreign accounts receivable by insisting on earlier payment for goods.

Advances on / discounting of Bills of Exchange

- Another approach is for an exporter to get a bank to give cash up front for a foreign debt by:
  - Agreeing for a bank to take collection of the payment and make an advance against it (the advance might be 80% to 90% of the value of the collection)
  - Selling the bill to a bank before it is due for a discounted amount

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Export factoring

- The exporter pays for the specialist expertise of the factor in order to reduce bad debts and the amount of investment in foreign accounts receivable.

Documentary credits / Letters of credit

- A method of payment in international trade, which gives the exporter a secure risk-free method of obtaining payment.
- The buyer (importer) and the seller (exporter) first of all agree a contract for the sale of the goods, which provides for payment through a letter of credit (a guarantee of payment).
- The buyer then requests a bank in his country to issue a letter of credit in favour of the exporter (through the letter, the bank guarantees payment to the beneficiary).

Countertrade

- A means of financing trade in which goods are exchanged for other goods.

Export credit insurance

- Insurance against the risk of non-payment by foreign customers for export debts.
- Premiums for export credit insurance are however very high and the benefits are sometimes not fully appreciated.

4 Techniques for managing accounts payable

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4.1 Using trade credit effectively

Trade credit helps to reduce the cash operating cycle and so the amount should be maximised, however care must be taken not to abuse suppliers as this can result in future credit being stopped. As relationships with suppliers develop, the amount of credit should be extended

4.2 Evaluating the benefits of discounts for early settlement and bulk purchase

In exactly the same way organisations offer their customers early settlement discounts (as discussed above), they may be offered early settlement discounts themselves. Before taking such discounts it is important to ensure that the benefits outweigh the costs (calculations very similar to lecture example 3.3 above).

4.3 Managing foreign accounts payable

Foreign accounts payable should be managed in exactly the same way as home accounts payable but if the amount due is denoted in a foreign currency, then the exchange rate will also need to be monitored and possibly hedged (see Chapter 7).

5 Techniques for managing cash balances

Cash will be held for three reasons:

(1) The transactions motive – to enable the organisation to meet foreseeable cash requirements e.g. paying suppliers and staff

(2) The precautionary motive – to enable the organisation to meet unforeseeable cash requirements e.g. paying an unexpected fine

(3) The speculative motive – to enable the organisation to benefit from one off opportunities e.g. taking advantage of an unexpected early settlement discount offer

5.1 Preparing cashflow forecasts

Cash is a critical resource for all businesses and the most common reason for business failure is running out of cash. Most businesses will be able to raise more cash as long as they have sufficient time to do so. It is thus essential to plan ahead by **preparing cash flow forecasts to determine future cash flows and cash balances**.

LECTURE EXAMPLE 3.4

Flow Co started in business in June, making children's ride on toy Jeeps. The following information is available for the first few months of trading. $50,000 of capital was put into the business at the start of June.

Forecast sales volumes for the first four months are as follows:

Month	**Sales (Jeeps)**
June	500
July	1,200
August	1,500
September	1,900

An initial selling price of $90 has been set

Normal trading terms are for customers to pay within one month of end of month of sale but a more realistic pattern of receipts is as follows:

Month of payment	**% of customers**
month of sale	30 (a 1% discount is given for paying in month of sale)
1 month later	50
2 months later	15

The remainder of customers are expected to never pay!

Closing inventory at the end of each month will be sufficient to meet one quarter of the following months' sales volumes. There was no inventory at the start of June.

Unit cost information is given as:

	$
Direct materials	15
Direct labour	20
Variable production overheads	5
Fixed production overheads	10
Total production cost	50

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Supporting notes:

(1) Direct materials. All materials needed in the production process will be purchased in the month of production and paid for one month later. It is policy not to hold any inventory for materials.

(2) Direct labour. All paid for in the month production occurs.

(3) Variable production overheads. 50% is paid in the month of production and 50% a month later.

(4) Fixed production overheads. The absorption rate used has been based on expected annual overheads of $180,000 and expected annual sales of 18,000 units. Fixed overheads are expected to be paid in equal instalments each month.

Prepare a detailed monthly cash budget for June, July and August.

SOLUTION

	June $	July $	August $
Receipts			
From customers (W1)			
Capital			
Payments			
Materials (W3)			
Labour (W4)			
Variable overheads (W5)			
Fixed overheads (W6)			
Net cash flow			
Opening balance			
Closing balance			

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Workings

(W1) Cash receipts from customers

	June	July	August
Sales			
Received in month of sale			
Received 1 month later			
Received 2 months later			
TOTAL			

(W2) Production

In order to work out our costs we need to establish the production volumes each month. This can be done by taking the sales volumes for a month, adding closing inventory and deducting opening inventory.

	June	July	August
Sales volume			
Add: closing inventory			
Less: opening inventory			
Production			

Now we know this we can calculate the cash flows for the variable costs:

(W3) Materials

	June	July	August
Production (W2)			
Material cost (@ $15 each)			
Cash payment			

(W4) Labour

	June	July	August
Production (W2)			
Labour cost (@ $20 each)			
Cash payment			

(W5) Variable overheads

	June	July	August
Production (W2)			
Variable overhead cost (@ $5 each)			
Cash payment			
Cash payment			
TOTAL			

(W6) Fixed overheads

Monthly cost =

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5.2 Centralised treasury management and cash control

Cash can be managed and controlled either at a local level or it can be centralised. Most organisations follow a **centralised treasury management and cash control** approach due to the benefits this brings:

- Allows the internal netting off of local surpluses and deficits which is cheaper
- Lower bank charges due to increased volumes through a single point
- Better interest rates on borrowing and lending due to increased volumes
- Reduced external foreign exchange due to internal netting off
- Allows the employment of experts due to the volume of work required

5.3 Cash management models

5.3.1 Baumol model

This model is based on the same principles as the inventory EOQ model and identifies the optimal cash holding level. When obtaining cash there are two relevant costs which need to be minimised:

(1) The cost of obtaining new funds (F)
(2) The cost of holding cash for a year (I)

The amount of cash to be raised (Q) can be calculated by using the following formula:

$$Q = \sqrt{\frac{2FS}{I}}$$

F = Cost of obtaining funds
S = Amount of cash required per annum
I = Cost of holding $1 for one year

And the total annual cost (TAC) is:

Annual order cost + Annual holding cost

$$TAC = F\frac{S}{Q} + I\frac{Q}{2}$$

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ILLUSTRATION 3.1

Reddies Co uses cash at the rate of $500 per month. It costs $20 each time cash is raised. The interest rate is 24% per annum.

What are the amounts of cash to be raised and the total annual cost?

SOLUTION

F = $20
S = $500 × 12months = $6,000
I = $1.00 @ 24% = $0.24

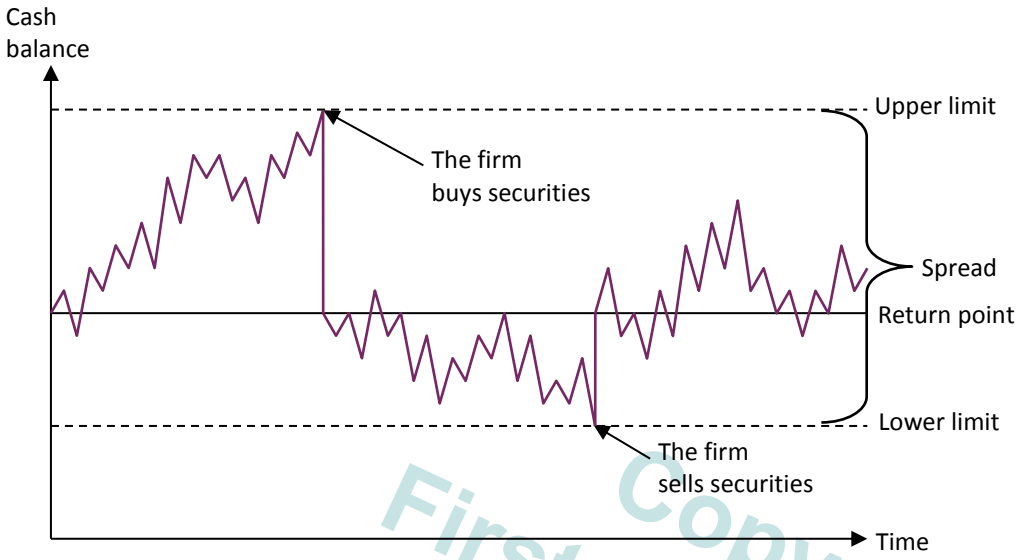
$$Q = \sqrt{\frac{2\times20\times6,000}{0.24}} = \$1,000$$

$$TAC = 20 \times \frac{6,000}{1,000} + 0.24 \times \frac{1,000}{2} = \$120 + \$120 = 240$$

By raising $1,000 of cash whenever Reddies needs cash, the total annual variable costs are minimised at $240.

5.3.2 Miller-Orr model

- The Baumol model assumes a constant use of cash which is unlikely in the real world.
- The Miller-Orr model is more realistic and allows for a varying cash balance and sets lower and upper limits between which the amount of cash should be kept.
- If the upper limit is breached, then cash is invested (in e.g. T-Bills) to reduce the amount of cash held and if the lower limit is breached, then cash is raised (by liquidating investments) to increase the amount of cash held, to take the cash balance to the return point:



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These three points are found as follows:

(1) Lower limit: this is set by the organisation and will normally be either nil or the overdraft limit

FORMULAE GIVEN IN EXAM

(2) Return point = Lower limit + (⅓ × spread)

(3) Spread = $3\left(\frac{3/4 \times \text{transaction cost} \times \text{variance of cash flows}}{\text{Interest rate}}\right)^{1/3}$

(4) Upper limit = Lower limit + spread

LECTURE EXAMPLE 3.5

Oscillate Co has an overdraft limit of $40,000 which it does not want to exceed. The variance of its daily cash flows is $400,000,000. The transaction cost of investing and raising funds is $575 and the interest rate is 0.03% per day.

What are the spread, return point and upper limit for Oscillate Co using the Miller-Orr model?

SOLUTION

Investing short-term

If an organisation has a short-term surplus, this can be used to:

- Offer more generous credit terms to customers
- Reduce short term borrowing (e.g. overdrafts)
- Put on deposit on the money markets

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6 Determining working capital needs and funding strategies

6.1 The level of working capital investment and key factors determining this level

The level of working capital investment in current assets is the monetary value of inventories and receivables. You may, for instance, be provided with the average receivables collection period and thus have to calculate the trade receivables by rearranging the average collection formula (from section 1.5)

The level of working capital investment in current assets will be determined by the following key factors:

6.1.1 The length of the working capital cycle and terms of trade

- The working capital (or cash operating) cycle depends in part upon the level of current assets; the higher the current assets, the longer the cash operating cycle and so the more cash there will be invested in working capital.
- The more generous the terms of trade offered to customers, the higher receivables will be and so once again the more cash there will be invested in working capital.

6.1.2 An organisation's policy on the level of investment in current assets

- There is no such thing as a correct level of investment in current assets and so this is a management decision based upon experience and the overall strategy of the organisation. This will be reflected in the organisation's policy on the level of investment in current assets.
- This will be driven by the organisation's attitudes to risk, liquidity and profitability (aggressive or conservative, per section 1.2)

6.1.3 The industry in which the organisation operates

- The level of current assets will be affected by the levels held by competitors. If competitors have high inventory levels to allow customers a wide selection with immediate delivery, it will be difficult not to match this.
- If competitors offer 90-day credit terms, again it will be difficult not to match this. So industry norms will have a significant influence on the level of current assets.
- For example, supermarkets will have shorter operating cycles (due to high power over suppliers, cash sales and low inventory (due to the perishable nature of their stock)), whereas manufacturers whose customers are businesses may need to hold greater stocks of inventory and offer trade credit (leading to increased operating cycles and investment in working capital).

6.2 Key factors in determining working capital funding strategies

6.2.1 The distinction between permanent and fluctuating current assets

- The overall level of current assets is likely to vary over time; this is particularly obvious if we think of a seasonal business. The level of current assets will fluctuate between a minimum and maximum level.
- The minimum level represents a permanent long-term requirement from a funding point of view; whereas the range between the minimum and maximum represent a temporary short-term requirement.

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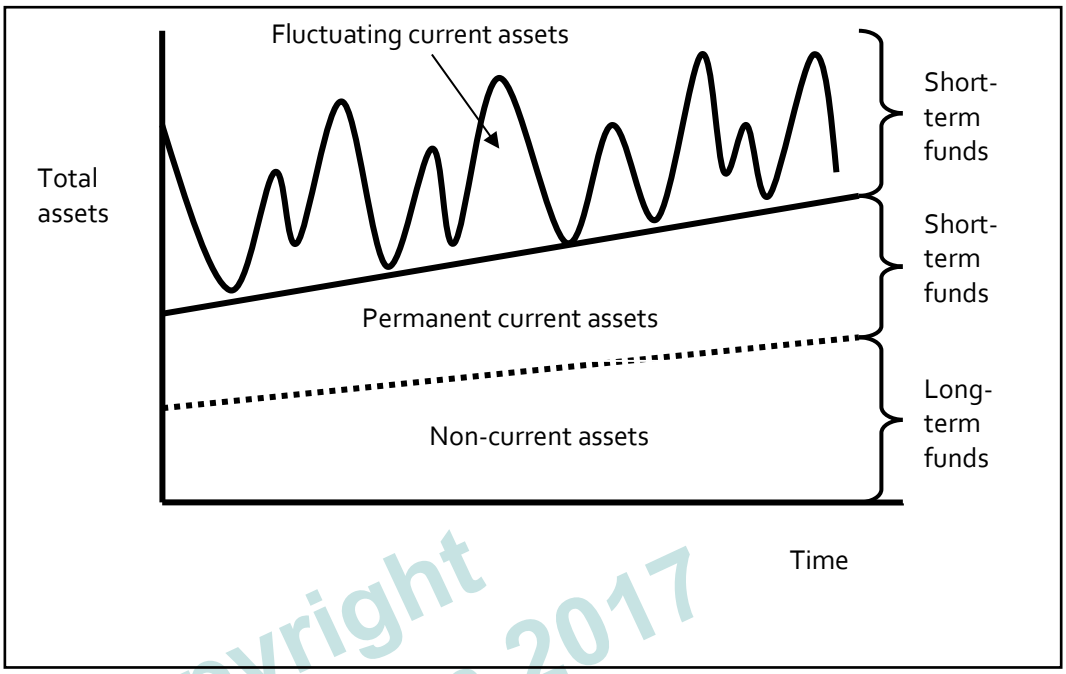
6.2.2 The relative cost and risk of short-term and long-term finance and the matching principle

- **Long term funding** is relatively expensive but is lower risk, as once it is raised, assuming there is no breach of any terms, it may be kept for the long term whether or not it is required.
- **Short-term funding** is relatively cheap (due to liquidity preference theory, see Chapter 7) but is higher risk, as once it is repaid there is no guarantee that it will be replaced even if it is required.
- **The matching principle** states that long term investments should be financed with long term finance e.g. people buy their homes with 25-year mortgages; and short term investments should be financed with short term finance e.g. if you don't have enough money to last until your next pay day, you use an overdraft.

The aggressive approach

As short-term funding is the cheapest source of finance, the most cost effective approach is to finance all of your current assets with short term finance. However, as there is no guarantee that this finance will be available when required, this is a very high risk strategy which should only be used if the organisation is confident of always being able to raise the required short-term finance. This strategy is called the aggressive funding policy.



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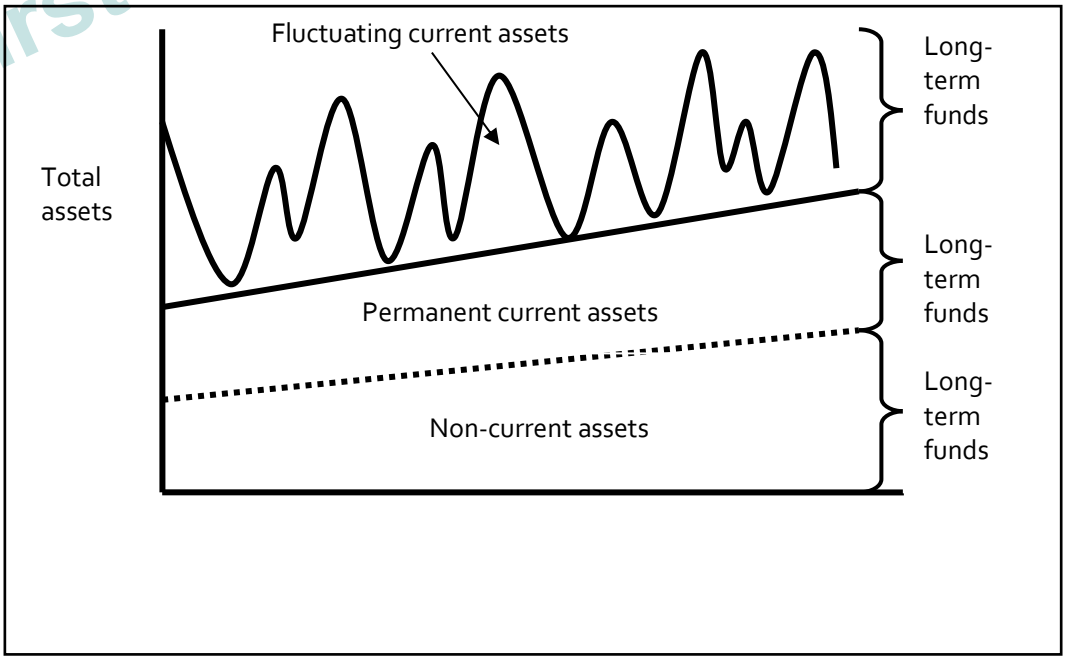
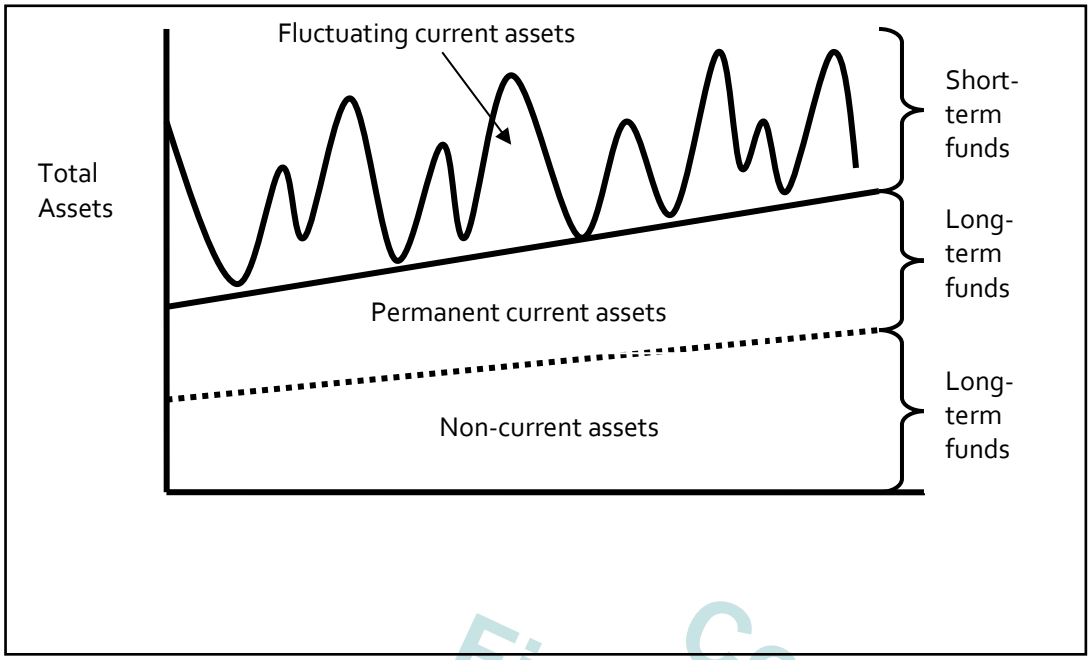
The conservative approach

Alternatively, long-term finance could be used to fund all of your current assets, this would be more expensive, but the organisation will know that it will not run out of funding and so is safe. Consequently, this is referred to as the conservative funding policy.



The matching approach

The matching funding policy uses long term funding for the minimum permanent current assets and uses short term finance for the range between the minimum and maximum. However there is still a risk that the required short term finance cannot be found.



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6.2.3 Management attitudes to risk, previous funding decisions and organisation size

- If management are high risk takers they are likely to adopt the aggressive funding policy and if they are risk averse they are likely to adopt the conservative funding policy. In practice most managers will be somewhere in between these two extremes and so the matching funding policy is very popular.
- Previous funding decisions for current assets will also influence the current decision as if these are seen as having been successful they are more likely to be repeated.
- Finally, larger organisations are able to raise funds relatively easily and so the risks of the aggressive funding policy may not in fact be that high.
- Smaller organisations find fund raising significantly harder and find raising long-term finance even harder than short term-finance and so, ironically, may be forced into the aggressive funding policy despite the high risks involved.

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4

Investment appraisal

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1 Investment appraisal techniques

1.1 Relevant cash flows

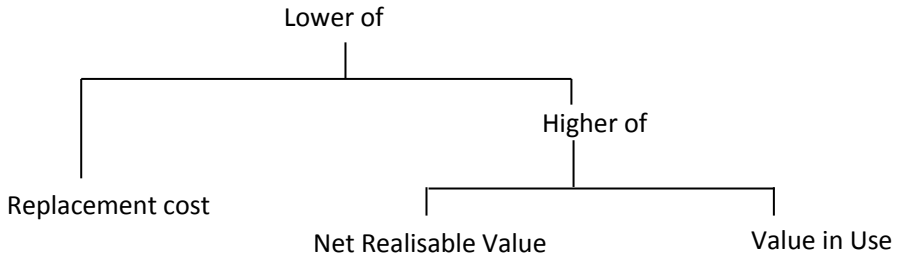
In investment projects it is important that the appraisal is based upon the correct information. The correct financial figures are the relevant costs. A relevant cost is defined as a future incremental cash flow. In other words for a figure to be relevant it must pass three tests:

(1) Future

- A decision being made today cannot change the past and so only future costs are considered.
- Past costs are sometimes referred to as sunk costs and are not relevant and so are ignored e.g. the price paid for something which is already owned.

(2) Incremental

- Only those costs that are affected by the decision are incremental and therefore relevant.
- Costs that are sometimes referred to as committed costs and are not relevant and so are ignored e.g. unavoidable fixed costs.
- Businesses need to consider lost opportunity costs (revenue / contribution lost from diverting resources away from an alternative use), which are also relevant.
- Businesses also need to consider the deprival value (the relevant cost of using capital items on a new project instead of continuing with their current use). A useful diagram for determining the deprival value for capital items is shown below:



(3) Cash flows

– These are factual and not based upon accounting conventions. Also organisations live or die due to their cash position. So non-cash flows are not relevant e.g. depreciation.

LECTURE EXAMPLE 4.1

Proposal Co is considering investing in a new project. The following details have been obtained:

The project requires 1,200 kg of raw material. Proposal Co has 2,000 kg in inventory, bought two years ago for $1.50 per kg, but no longer used for any of the firms' products. The current market price for the material is $2.00 per kg, but Proposal Co could only sell it for $0.80 per kg.

100 hours of labour will be used on this project. There are 300 hours' worth of spare labour capacity. There is a union agreement that staff cannot be laid-off. The workers are paid $6.50 per hour.

The variable overheads will total $34,564 and the fixed overhead rent $42,500.

The project will require a machine which was bought four years ago for $20,000. This machine could be scrapped now for $12,000. If it is kept it will generate $15,000. An identical machine can currently be purchased for $14,000.

What are the relevant costs of this project?

SOLUTION

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1.2 Payback period

The payback period is the time it takes for the net cash flow of a project to equal zero i.e. cash inflows = cash outflows.

LECTURE EXAMPLE 4.2

Horizon Co is considering a project that will require an investment in machinery of $80,000 and which will generate a net income of $15,000 in the first year, increasing by $5,000 each subsequent year. The project is expected to last for five years and the machinery is not expected to have any residual value.

Calculate the payback period of this project.

SOLUTION

	Annual cash flow $	**Cumulative cash flow** $
Investment		
First year		
Second year		
Third year		
Fourth year		

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The usefulness of payback as an investment appraisal method is:

- It is simple to calculate
- It is easy to understand, especially for non-accountants
- It uses relevant cash flows
- It can be used as an initial screening tool on projects before undertaking a more detailed review
- It (rather crudely) allows for risk

1.3 Return on capital employed (accounting rate of return)

The Return On Capital Employed (ROCE), or Accounting Rate of Return (ARR) as it is also known, is calculated as follows:

$$\text{ROCE} = \frac{\text{Average annual profit of the project}}{\text{Average investment}} \times 100$$

Where:

$$\text{Average annual profit of the project} = \frac{(\text{Total net cash flows} - \text{Total depreciation})}{\text{Length of project}}$$

$$\text{Average investment} = \frac{(\text{Initial investment} + \text{Scrap value})}{2}$$

This measures the return made by the project from the amount of capital invested and so gives an indication as to how efficient the project is at generating profits from its capital investment.

LECTURE EXAMPLE 4.2 CONTINUED (PART 2)

Calculate the ROCE for Horizon Co.

SOLUTION

The ROCE usefulness as an investment appraisal method is:

- It is simple to calculate
- As a percentage the measure is familiar to non-accountants
- It looks at the entire project
- It reflects the way external investors judge the organisation

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1.4 Present Valuing

When money is borrowed or invested, the amounts grow larger over time as interest is added, however when appraising investments we want to know what they are worth to the organisation now, so that we can directly compare different potential investments. Thus we need to calculate present values.

To calculate the present value of a future value we can use the following formula:

FORMULA GIVEN IN EXAM

$$PV = FV \times (1 + r)^{-n}$$

Where:

FV = future value
r = period interest rate expressed as a decimal
n = number of periods

As the present value is lower than the future value, the multiplier is called the discount factor.

LECTURE EXAMPLE 4.3

Money Bags is expecting to receive $16,751 in six years. Interest rates will be 5% for the whole six years.

Calculate the present value of Money Bags' receipt.

SOLUTION

1.4.1 Annuities

Some investments generate a constant return, this is called an annuity. The present value of an annuity can be calculated by using the following formula:

FORMULA GIVEN IN EXAM

$$PV = A \times \frac{1-(1+r)^{-n}}{r}$$

Where:

PV = present value
A = constant return (starting in one year's time)
r = period interest rate expressed as a decimal
n = number of periods

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LECTURE EXAMPLE 4.4

Henry Stanley is going to receive $150 every year for 12 years. The annual interest rate is 6%.

Calculate the present value of Henry Stanley's annuity.

SOLUTION

FORMULA GIVEN IN EXAM

In the exam you are given **Present Value** and **Annuity Tables** where the discount factors for individual cash flows and annuities have already been calculated for whole percentages from 1% to 20% for periods 1 to 15.

LECTURE EXAMPLE 4.3 REVISITED

Money Bags is expecting to receive $16,751 in six years. Interest rates will be 5% for the whole six years.

Calculate the present value of Money Bags' receipt using the discount tables.

SOLUTION

LECTURE EXAMPLE 4.4 REVISITED

Henry Stanley is going to receive $150 every year for 12 years, starting in one year's time. The annual interest rate is 6%.

Calculate the present value of Henry Stanley's annuity using the discount tables.

SOLUTION

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1.4.2 Delayed Annuities

The annuity formula and annuity factors from the annuity table assume that the first cashflow will occur in one year's time.

If that is not the case, then the annuity formula / annuity factors should be used to calculate the value as at one year before the start of the annuity. Then a discount factor may be used to find the present value.

LECTURE EXAMPLE 4.5

Henry Stanley is going to receive $150 every year for 12 years, starting in four years' time. The annual interest rate is 6%.

Calculate the present value of Henry Stanley's annuity.

SOLUTION

1.4.3 Perpetuities

Some annuities last forever, these are called a perpetuities. The present value of a perpetuity can be calculated by using the following formula:

$$PV = A \times \frac{1}{r}$$

Where:

PV = present value
A = constant return (starting in one year's time)
r = period interest rate expressed as a decimal

LECTURE EXAMPLE 4.6

Victoria is expecting to receive $2,000 a year for ever, starting in one year's time. Interest rates are expected to remain constant at 5%.

Calculate the present value of Victoria's perpetuity.

SOLUTION

1.4.4 Net Present Value

- Most investments will involve a series of cash outflows and inflows at different points in time.
- If we calculate the present value of each cash flow and then add all the present values together, we can calculate the Net Present Value (NPV) of the investment.
- A positive NPV represents the present value of the excess return of the project over and above the cost of capital, hence investments with a positive NPV should be undertaken (as the return on the project beats the cost of financing the project)
- Projects with a negative NPV should not be undertaken

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LECTURE EXAMPLE 4.2 CONTINUED (PART 3)

The funding used by Horizon Co costs 10%.

Calculate the NPV for Horizon Co.

SOLUTION

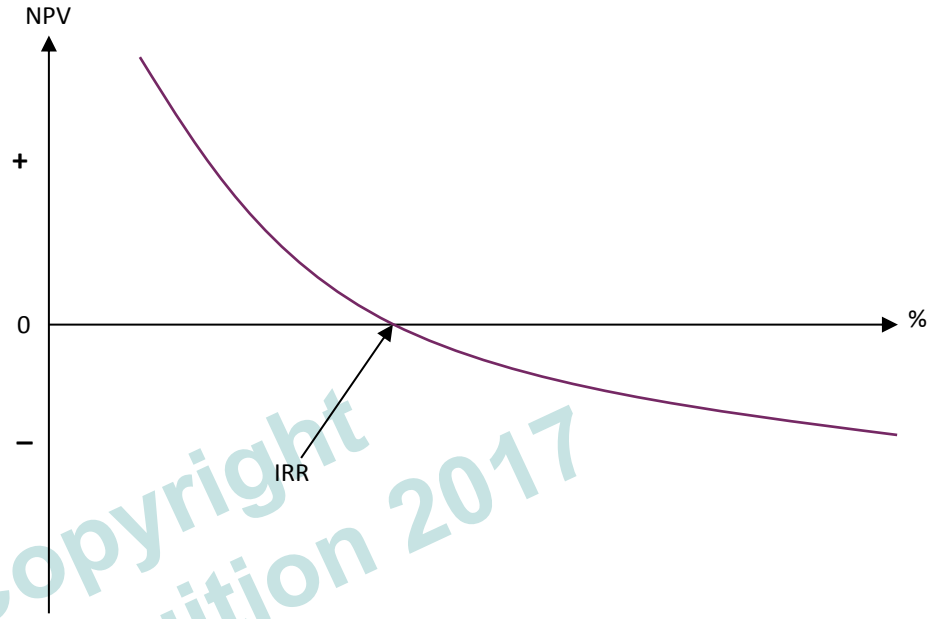
Timing	Cash flow	Discount Factor	Present Value
	$	10%	$
0			
1			
2			
3			
4			
5			
		NPV =	

The net present value's usefulness as an investment appraisal method is:

- It allows for the time value of money
- It shows the change in shareholders' wealth
- It can allow for risk via the cost of capital
- It looks at the entire project

1.5 Internal Rate of Return

The Internal Rate of Return (IRR) is the discount factor which gives a zero NPV. As the discount factor increases, the NPV reduces. As can be seen on the following diagram, this forms a curved relationship:



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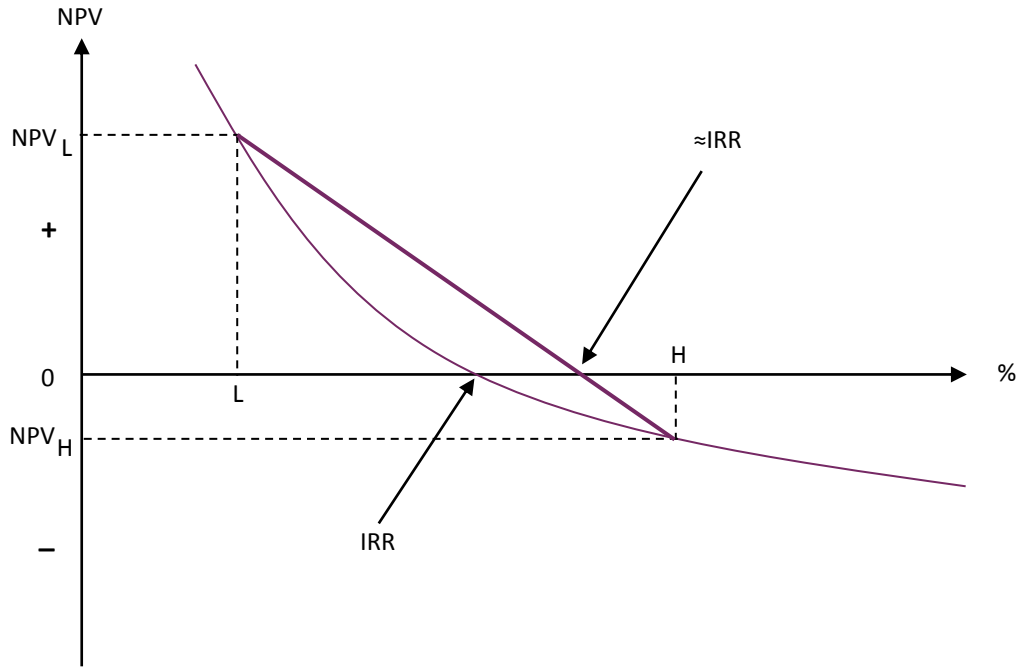
Due to this curved relationship, finding the precise IRR would be very time consuming, so instead we find an approximate IRR by finding two points on the curve and then assuming that there is a straight line between them:



We can then use the following formula to find this approximate IRR:

$$IRR \approx L + \frac{NPV_L}{NPV_L - NPV_H} \times (H - L)$$

Where:

L = lower discount factor
H = higher discount factor

LECTURE EXAMPLE 4.2 (PART 4)

Calculate the approximate IRR for Horizon Co.

SOLUTION

Timing	Cash flow	Discount Factor	Present Value	Discount Factor	Present Value
	$	10%	$		$
0	(80,000)	1.000	(80,000)		
1	15,000	0.909	13,635		
2	20,000	0.826	16,520		
3	25,000	0.751	18,775		
4	30,000	0.683	20,490		
5	35,000	0.621	21,735		
			$11,155		

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The internal rate of return's usefulness as an investment appraisal method is:

- It does not require the exact cost of funds to be known
- As a percentage the measure is familiar to non-accountants
- It looks at the entire project
- It provides a relative measure of performance

1.6 Advantages of discounted cash flow (DCF) methods over non-DCF methods

DCF methods are superior to non-DCF methods because they:

- Allow for the timing of the cash flows
- Use the relevant costs and revenues
- Look at the impact of the entire project

1.7 The relative merits of NPV and IRR

The relative merits of NPV over IRR are:

- It provides a clear decision i.e. accept if positive, reject if negative
- It always gives the correct decision (when evaluating single projects, or mutually exclusive projects)
- It always gives a single answer (some projects have more than one IRR)
- It maximises the shareholders' wealth

The relative merit of IRR over NPV is:

- It is much easier for non-accountants to accept
- It does not require the exact cost of funds to be known

2 Allowing for inflation and taxation in discounted cash flows

2.1 Real vs. Nominal terms

- The interest rate set by the Bank of England allows for the current level of inflation and is called the **nominal interest rate** (sometimes called the 'money rate').
- As inflation causes prices to rise, if you were to invest money at the nominal interest rate, you would only benefit by the nominal interest after adjusting for the inflation rate. This net or ignoring inflation return is called the **real interest rate**, as it shows how much better off you really are.
- The relationship between real and nominal interest rates is:

FORMULA GIVEN IN EXAM

$$(1 + i) = (1 + r) \times (1 + h)$$

Where:

i = nominal interest rate
r = real rate
h = general inflation rate

So there are two different rates;

- **Real rate** (excludes inflation, compensates the lender for the time value of money)
- **Nominal rate** (includes inflation, compensates the lender for TVM and inflation)

In choosing which rate to use we must be consistent:

- If the cash flows exclude inflation (**'real' cashflows**) then so must the discount factor (**'real' rate**)
- If the cash flows include inflation (**'nominal'** or **'money' cashflows**) then so must the discount factor (**'nominal' rate**)

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ILLUSTRATION 4.1

Rise Co is considering a project that will require an investment in machinery of $50,000 and which will generate net income of $18,000 in the first year, $24,000 in the second year and $33,000 in the third and final year. The cost of funds is 12%. None of these figures include inflation.

Calculate the NPV for Rise Co.

SOLUTION

Timing	Cash flow	Discount Factor		Present Value
	$	12%		$
0	(50,000)	1.000		(50,000)
1	18,000	0.893		16,074
2	24,000	0.797		19,128
3	33,000	0.712		23,496
			NPV =	$8,698

ILLUSTRATION 4.1 REVISITED

Inflation is currently 7% and is expected to remain at this level for at least the next three years in the country where Rise Co operates.

Calculate the NPV for Rise Co including inflation.

SOLUTION

To include inflation in the cost of funds we use the formula:

$(1 + i) = (1 + r) \times (1 + h)$

$(1 + i) = (1 + 0.12) \times (1 + 0.07)$
$(1 + i) = 1.1984$
$i = 0.1984$ or 19.84%

Timing	Real cash flow	Inflation	Nominal cash flow	Discount Factor		Present Value
	$	7%	$	19.84%		$
0	(50,000)	1.00	(50,000)	1.000		(50,000)
1	18,000	1.07	19,260	0.834		16,063
2	24,000	1.07^2	27,478	0.696		19,125
3	33,000	1.07^3	40,426	0.581		23,488
					NPV =	$8,676

Note. The small differences are due to rounding of discount factors to 3 d.p.

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2.2 The impact of tax

- Businesses pay tax on their profits and hence, if a project makes a profit or loss then the organisation will have to pay more or less tax.
- We will assume that tax is calculated on the net operating cash flows unless the Examiner specifically tells us otherwise.
- If any equipment has been purchased, there will be a tax saving as a result of capital allowances (sometimes referred to tax allowable depreciation).
- The best approach is to calculate the tax on the operating cash flows and the saving on capital allowances as two separate figures.

ILLUSTRATION 4.2

Penalty Co is considering a project that will require an investment in machinery of $40,000 and which will generate revenue of $27,000 in the first year, $37,000 in the second year and $49,000 in the third and final year. The direct costs will equal 35% of the revenue and relevant overheads will be $9,000 each year. It is thought that the machinery will be sold for $19,000 at the end of the project.

Penalty Co pays 30% corporation tax on its net operating cash flows and can claim capital allowances on the machinery at 25% on a reducing balance basis, with a balancing allowance or charge in the final year. All tax is paid or saved at the end of year in which the cash flows arise. The cost of funds is 9%.

Calculate the NPV for Penalty Co.

SOLUTION

Time	**0**	**1**	**2**	**3**
	$	$	$	$
Revenue		27,000	37,000	49,000
Direct costs @ 35%		(9,450)	(12,950)	(17,150)
Overheads		(9,000)	(9,000)	(9,000)
Net operating cash flows		8,550	15,050	22,850
Tax @ 30%		(2,565)	(4,515)	(6,855)
Machinery	(40,000)			19,000
Capital allowance savings (W1)		3,000	2,250	1,050
Net cash flow	(40,000)	8,985	12,785	36,045
Discount Factor @ 9%	1.000	0.917	0.842	0.772
Present Value	(40,000)	8,239	10,765	27,827

NPV = $6,831

Workings:

Capital Allowances (W1)

Time	**1**	**2**	**3**
Opening value of equipment	**40,000**	30,000	22,500
Closing value of equipment	30,000	22,500	**19,000**
Capital Allowances 25% reducing balance	10,000	7,500	3,500
Tax Saving at 30%	**3,000**	**2,250**	**1,050**

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2.3 Working capital

When a company invests in a new project it may need to increase its investment in working capital (e.g. increase the value of receivables and inventory held).

Any increase in working capital investment ties up cash, hence we need to treat this as a cash outflow in our NPV calculation, with any decrease in working capital treated as a cash inflow.

Notes:

- The working capital investment for a new project will usually need to be in place at the start of the project and released in full at the end of the project.
- If the level of working capital investment is increased at the end of a year, the incremental change will be a cash outflow in that year (for any reduction in working capital investment the incremental change will be a cash inflow)
- There is no tax payable or receivable on the working capital cash flows.

ILLUSTRATION 4.3

A company plans to make sales of £100,000 in year 1, increasing by 5% per annum until year 3 when the project ends. Working capital equal to 15% of annual sales is required at the start of each year.

What are the working capital cash flows for the NPV calculation?

SOLUTION

Time	**0**	**1**	**2**	**3**
	$	$	$	$
Sales		100,000	105,000	110,250
Working capital required (15% x sales)	15,000	15,750	16,538	0
Working capital CF	(15,000)	(750)	(788)	16,538

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2.4 Standard NPV calculation layout

2.4.1 Lead schedule ($000s)

	Time	0	1	2	3	4	5
Operating cashflows	Revenue	0	250	220	200	190	170
	Variable Costs	0	(100)	(88)	(80)	(76)	(68)
	Contribution	**0**	**150**	**132**	**120**	**114**	**102**
	Incremental Fixed Costs	0	(20)	(20)	(20)	(20)	(20)
	Net Operating Cashflow	**0**	**130**	**112**	**100**	**94**	**82**
	Tax @ 30% (if same year)	0	(39)	(34)	(30)	(28)	(25)
Capital cashflows	Capital Expenditure	(400)					
	Scrap Value						100
	Tax saving on Cap Allowances (W)		30	23	17	13	8
	Working Capital	(25)	3	2	1	2	17
	Net Cashflow	**(425)**	**124**	**103**	**88**	**81**	**182**
	DCF @10%	1	0.909	0.826	0.751	0.683	0.621
	Present Value	**(425)**	**113**	**85**	**66**	**55**	**113**
	Net Present Value	**$7k**					

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2.4.2 Capital allowance workings

Capital Allowances (W)

Time	1	2	3	4	5
Opening value of equipment	**400**	300	225	169	127
Closing value of equipment	300	225	169	127	**100**
Capital Allowances 25% reducing balance	100	75	56	42	27
Tax Saving at 30% **(included in lead schedule)**	**30**	**23**	**17**	**13**	**8**

2.5 Comprehensive example

- The Examiner likes to ask investment appraisal questions that bring together several of the elements of the syllabus that have been covered so far.
- This can be seen in the following exam standard example.

LECTURE EXAMPLE 4.7

Funtime Co, a toy company, has developed a new game, 'Zoom', which it plans to launch in time for the school summer holidays. Sales of the new game are expected to be very strong, following a favourable review by a national newspaper. Sales and production volumes and selling prices for 'Zoom' over its four-year life are expected to be as follows:

Year	**1**	**2**	**3**	**4**
Sales and production (no. of games)	150,000	70,000	60,000	60,000
Selling price (per game)	$25	$24	$23	$22

Financial information on 'Zoom' in current prices is as follows:

Direct material cost	$5.40 per game
Other variable production cost	$6.00 per game
Apportioned fixed costs	$4.00 per game

Advertising costs to stimulate demand are expected to be $650,000 in the first year of production and $100,000 in the second year of production. No advertising costs are expected in the third and fourth years' of production. 'Zoom' will be produced on a new production machine costing $800,000. Capital allowances can be claimed at 20% on a straight-line basis, with a balancing allowance or balancing charge in the final year. It is expected that the machine will be sold for $150,000 at the end of the project.

Funtime Co pays tax on cash flows at the rate of 30% per year and tax liabilities are settled at the end of the year in which they arise. Inflation at 3% pa is expected to apply to the production costs for the duration of the project.

If the new game is launched then sales of another game 'Skip' would be reduced due to lack of resources to devote to this other game. This reduction in sales would amount to 10,000 units per year. 'Skip' currently earns a contribution of $15 per game and this would be expected to remain constant over the next four years.

Working capital equal to 10% of the annual sales revenue is needed at the start of each year. All working capital will be released at the end of the project.

Required

Calculate the net present value of the proposed investment using an after tax nominal discount rate of 15%.

SOLUTION

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3 Adjusting for risk and uncertainty in investment appraisal

3.1 Risk and uncertainty

- It is impossible to be sure as to what will happen in the future; there will always be a range of possible outcomes.
- **Risk** is when there is a range of possible outcomes and the likelihood of those outcomes can be quantified in the form of probabilities.
- **Uncertainty** is when there is a range of possible outcomes, but the likelihood of the outcomes cannot be quantified
- As a project's life increases it becomes harder to quantify the likelihood and so the outcomes are more likely to be uncertain. There are a range of techniques to deal with both risk and uncertainty in project appraisal:

3.2 Sensitivity Analysis (uncertainty)

Sensitivity analysis involves seeing how much the estimates used to make the original decision can change before the decision becomes incorrect. The less they can change, the more sensitive the decision.

When calculating the sensitivity for a particular cash flow the following formula is used:

$$\frac{\text{NPV}}{\text{PV of required variable}} \times 100\%$$

When calculating the sensitivity to the cost of capital, the following formula is used:

$$\frac{\text{IRR - Cost of capital}}{\text{Cost of capital}} \times 100\%$$

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ILLUSTRATION 4.2 (PART 2)

How sensitive is Penalty Co's decision to invest in new machinery to changes in the sales volume, overheads and cost of capital?

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The usefulness of sensitivity analysis in assisting investment decisions is:

- It gives an indication of how likely the project is to be successful
- It indicates which forecasts should be researched further
- It also indicates which variables require the closest control once the project starts

3.3 Probability analysis and expected values (risk)

- If it is possible to identify the possible outcomes (x) and their associated probabilities (p). By multiplying each outcome by its probability and adding all of the results together (∑px), an **expected value** (probability-weighted average result) can be calculated.
- This expected value can then be used in investment appraisal.

LECTURE EXAMPLE 4.8

Possibly Co is considering a project which requires equipment costing $300,000.

In the first year the sales revenue will be $480,000. In the second year the sales figures will either be high (probability 0.55) $650,000 or low (probability 0.45) $350,000. In the third and final year the sales figures will either be high (probability 0.25) $600,000, medium (probability 0.6) $500,000 or low (probability 0.15) $400,000. The direct costs will equal 60% of the revenue and relevant overheads will be $54,000 each year.

It is thought that the equipment could be sold for either $160,000 (probability 0.4) or $110,000 (probability 0.6) at the end of the project, though it will not be eligible for capital allowances. Corporation tax will be 35% of the net operating cash flows for the next three years. All tax is paid or saved at the end of year in which the cash flows arise. The cost of funds is 13%.

(a) Calculate the expected net present value of the project being considered by Possibly Co.
(b) What is the probability that the total revenue exceeds $1,600,000?

SOLUTION

(a)

Time	**0**	**1**	**2**	**3**
	$	$	$	$
Expected revenue (W1)				
Direct costs @ 60%				
Overheads				
Net operating cash flows				
Tax @ 35%				
Equipment (W2)				
Net cash flow				
Discount Factor @ 13%				
Present Value				

Expected NPV = $

Workings:

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The usefulness of probability analysis in assisting investment decisions is:

- It allows us to evaluate risky investments
- It allows us to quantify the risk

The limitations of using probability analysis are:

- Expected values are not meaningful in one off decision making situations since they represent a long run average value. Take the example above, achieving sales of $510k will not happen (it will either be $600k, $500k or $400k) in an individual year. Hence, expected values are more appropriate for assessing decisions or cashflows which will be repeated.
- Expected values ignores the spread of possible returns (i.e. risk), as they average the outcomes. A separate measure is needed to show the spread of possible returns (such as the standard deviation or simulation).
- Expected values rely on the accuracy of the probabilities used.

3.4 Other techniques to cope with risk and uncertainty

3.4.1 Simulation

- In real life investment appraisal situations there will often be a very large number of variables with a large range of possible values.
- In such situations, expected value analysis alone may not be appropriate and hence **simulation** is used.
- Simulation involves identifying each of the different variables, the range of the different values of those variables and the probabilities of those values.
- Hundreds, thousands or more simulations are then run to record the NPVs of the project for different combinations of values for the different variables (using random numbers and computers to select values for each of the variables).
- The results then show the expected NPV and the distribution of possible NPV values.

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3.4.2 Risk-adjusted discount rates

- As we have already seen the discount factor reduces the future cash flows to allow for the time value of money.
- As the future cash flows also contain risk, the discount factor can be adjusted to reflect this risk. So a project with more risk would have a higher discount factor applied to it and so the NPV would be reduced to reflect this risk.

3.4.3 Adjusted payback

- The adjusted payback (also known as discounted payback) involves adjusting the cash flows in the payback calculation to take account of the risk.
- In practice this means reducing the future cash flows to reflect the risk in the estimated figures. As forecasting is generally harder the further into the future you predict, the reduction needs to be greater for more distant figures.

LECTURE EXAMPLE 4.2 REVISITED (PART 5)

Horizon Co now realises that the payback period it has already calculated is too simplistic and so it is considering using an adjusted payback by discounting the cash flows to reflect the risk in these forecasts, using its cost of funds.

Calculate the adjusted payback period of this project.

SOLUTION

Time	Cash flow	Discount factor	Present value	Cumulative PV
	$	10%	$	$
0	(80,000)	1.000	(80,000)	
1	15,000	0.909	13,635	
2	20,000	0.826	16,520	
3	25,000	0.751	18,775	
4	30,000	0.683	20,490	
5	35,000	0.621	21,735	

- This is more appropriate than using undiscounted cashflows, as it factors in the time value of money and uncertainty surrounding later cashflows.
- However, the adjusted payback method still suffers from the same shortcomings as the standard payback period (e.g. no consideration of cashflows later than the payback date, the need for a target payback period to compare to).

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4 Specific investment decisions

4.1 Lease vs. buy

- Once an organisation has decided to acquire an asset it then needs to decide how it is going to finance this acquisition. The two alternatives we are going to compare here are leasing the asset or borrowing the required funds and buying the asset.
- The most significant difference between these two alternatives is that with a lease, the organisation (lessee) is not the legal owner; whereas if the asset is purchased then the organisation is the legal owner.
- Legal ownership is particularly important when considering taxation. Only the legal owner can claim capital allowances, however the lease payments are assumed to be fully tax allowable.
- Any disposal proceeds are also only received by the legal owner and so are also a relevant cash flow.
- To evaluate these two alternatives we discount the relevant cash flows and see which option is cheapest. We can discount the cash flows using any discount factor, however it is **recommended to use the cost of borrowing**.
- The reason for this is that we can then avoid calculating and including the loan repayments and interest and instead just put in the amount borrowed e.g. If you borrow $1,000 for one year at 10% interest, in one year you will have to repay $1,100. If you discount this at 10%, the present value is $1,000 i.e. the amount borrowed.

4.1.1 Before- and after-tax discount rates

If in cash flows we allow for the impact of tax; to be consistent we should also allow for the impact of tax on the discount rate.

Let us compare two companies both earning the same amount, however one has borrowed $1,000 and pays 10% interest and the other has not:

	No Interest Co	Interest Co
	$	$
Earnings	800	800
Interest	nil	(100)
	800	700
Tax @ 30%	(240)	(210)
After tax earnings	560	490

So despite paying $100 of interest, Interest Co after tax earnings are only $70 lower than No Interest Co. Hence the after-tax cost is:

10% (1 – 0.30) = 7%

Or in more general terms:

Before-tax rate (1 – tax rate) = After-tax rate

- If we are discounting post-tax cashflows, then we need to use a post-tax discount rate.
- Therefore, if tax is included in the cash flows in a lease vs buy calculation the cash flows should be discounted at an after- tax cost of borrowing.
- The examiner may provide you with a discount rate which is already post tax – hence it's very important to read the question

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ILLUSTRATION 4.2 (PART 3)

Penalty Co has decided that it would like a machine costing $40,000. It can either borrow the money from its bank at an interest rate of 13% or a leasing company has offered to lease the machine to Penalty Co for three years at an annual cost of $11,300. It is thought that the machine can be sold in three years' time for $19,000.

Would it be better for Penalty to lease or borrow and buy this machine?

SOLUTION

Lease:

Timing	Cash flow	Discount Factor	Present Value
	$	13%	$
1 – 3	(11,300)	2.361	(26,679)

Borrowing and buy:

Timing	Cash flow	Discount Factor	Present Value
	$	13%	$
0	(40,000)	1.000	(40,000)
3	19,000	0.693	13,167
			$(26,833)

The two alternatives are very close, but the lease is marginally cheaper.

In the previous example we ignored tax. As we earlier, tax reduces the cost of debt and brings in tax on the operating cash flows and capital allowances.

ILLUSTRATION 4.2 (PART 4)

Would it be better for Penalty to lease or borrow and buy this machine after allowing for tax?

SOLUTION

The after tax cost of borrowing = 13% (1 – 0.30) = 9%

Lease:

Time	**0**	**1**	**2**	**3**
	$	$	$	$
Payments		(11,300)	(11,300)	(11,300)
Net operating cash flows		(11,300)	(11,300)	(11,300)
Tax saved @ 30%		3,390	3,390	3,390
Net cash flow		(7,910)	(7,910)	(7,910)
Discount Factor @ 9%		0.917	0.842	0.772
Present Value		(7,253)	(6,660)	(6,107)

NPV = $(20,020)

Borrow and buy:

Time	**0**	**1**	**2**	**3**
	$	$	$	$
Borrow	(40,000)			
Machinery				19,000
Capital allowance savings (W1 from illustration 4.2 part 1)		3,000	2,250	1,050
Net cash flow	(40,000)	3,000	2,250	20,050
Discount Factor @ 9%	1.000	0.917	0.842	0.772
Present Value	(40,000)	2,751	1,894	15,479

NPV = $(19,876)

The two alternatives are still very close, but now borrow and buy is marginally cheaper.

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4.2 Asset replacement decisions using equivalent annual cost

Sometimes an investment decision will involve choosing between two alternatives where the benefits are unequal e.g. comparing renting one property for five years and an alternative for seven years.

In such situations comparing the NPV's would not necessarily give the correct decision and so instead we calculate the equivalent annual cost (EAC):

$$\text{EAC} = \frac{\text{NPV}}{\text{Annuity factor for the project life}}$$

- The EAC represents a constant annual cashflow that has the same present value as the actual cashflows arising under each proposal. The proposal with the lowest EAC should be chosen.
- We are assuming that the replacement will keep happening forever.

LECTURE EXAMPLE 4.9

Mobile Co is trying to decide whether to replace its grinding machines every one, two or three years. Each machine costs $7,000. Mobile Ltd has a cost of capital of 12%. Costs and scrap value data is as follows:

Year	**1**	**2**	**3**
	$	$	$
Maintenance costs	500	1,000	1,500
Running costs	2,500	3,000	3,250
Year-end scrap value	5,000	3,500	2,500

What is the optimum replacement cycle for the machines?

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4.3 Investment decisions under single period capital rationing

Single period capital rationing describes the situation where an organisation does not have sufficient funds to undertake all positive NPV projects at one particular point in time.

4.3.1 The calculation of profitability indexes for divisible investment projects

- If the investment projects are divisible, this means that part of a project could be undertaken and a comparable part of the positive NPV generated.
- In such situations we need to rank the projects by identifying the net present value generated from the current investment or in other words, how much NPV do we generate from each $1 of investment. This measure is known as the Profitability Index (PI):

$$PI = \frac{\text{Net Present Value}}{\text{Initial investment}}$$

ILLUSTRATION 4.4

Short Co is trying to choose between four projects, all of which have positive NPV's, however Short only has $1,000,000 to invest. Details of the four projects are as follows:

Project:	**A**	**B**	**C**	**D**
	$	$	$	$
Initial investment	(300,000)	(370,000)	(143,000)	(1,000,000)
PV of future cash flows	445,000	500,000	200,000	1,340,000
NPV	145,000	130,000	57,000	340,000

All four of the projects are divisible.

What is the optimum investment policy for Short Co?

SOLUTION

Project:	**A**	**B**	**C**	**D**
	$	$	$	$
NPV	145,000	130,000	57,000	340,000
Initial investment	300,000	370,000	143,000	1,000,000
Profitability Index	0.48	0.35	0.40	0.34
Ranking	1st	3rd	2nd	4th

Project	**Proportion**	**NPV**	**Funds available/required**
	%	$	$
			1,000,000
A	100	145,000	(300,000)
			700,000
C	100	57,000	(143,000)
			557,000
B	100	130,000	(370,000)
			187,000
D	18.7	63,580	(187,000)
		$395,580	Nil

So Short Co should do all of projects A, C, and B and 18.7% of D.

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4.3.2 The calculation of the NPV of combinations of non-divisible investment projects

If the investment projects are non-divisible, this means that either the whole project is undertaken or none of it is undertaken.

In such situations we need to identify all possible combinations of whole projects that can be undertaken and then select the combination with the greatest total NPV.

ILLUSTRATION 4.4 CONTINUED

Short Co now realises that the four projects are non-divisible.

What is the optimum investment policy for Short Co?

SOLUTION

Possible combinations	Required investment	Total NPV
	$	$
A, B & C	813,000	332,000
D	1,000,000	340,000

So Short Co should undertake project D

4.3.3 A discussion of the reasons for capital rationing

Capital rationing can be caused by two different reasons:

(1) The organisation would like to raise more funds, but no stakeholder is prepared to invest. This is known as **hard** capital rationing and may result from the potential returns not being high enough to compensate for the perceived risks involved.

(2) The organisation could raise more funds, but has internally decided not to. This is known as **soft** capital rationing and may result from a concern that the available finance is too expensive or may result in a loss of control.

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5

Business finance

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1 Sources of and raising business finance

1.1 Identify and discuss the range of short-term sources of finance available to businesses

1.1.1 Overdraft

An **overdraft** is an overdrawn balance on a current account and is the most common form of bank funding. This is due to their flexibility and ease of operation; a facility letter is all that is required to initiate this facility. In the UK overdrafts are strictly repayable on demand. Interest which is variable and calculated daily tends to be at a higher rate than other short-term sources of finance.

1.1.2 Short-term loan

A **short-term loan** is where a fixed amount of funds are borrowed for a fixed period (of less than one year) of time at the end of which the full amount has to be repaid. Interest is charged on the total amount borrowed either at a fixed or variable rate.

1.1.3 Trade credit

Trade credit refers to the provision of credit by trade suppliers. This is an important source of financing for current assets. Trade credit is often described as a 'free' source of finance as interest is not charged, however delayed payment could result in the loss of a settlement discount, interest being charged on the overdue amount (Late Payment of Commercial Debts (Interest) Act 1998) or the loss of future credit.

1.1.4 Lease finance

Short-term **lease finance** is in the form of an operating lease where finance is provided specifically to access the use of a particular asset e.g. a photocopier. The legal ownership of the asset remains with the lessor, however the lessee has physical use of the asset and makes (normally monthly) payments

for doing so. This is consequently very similar to renting an asset and due to the security provided by the asset, operating leases are often available to organisations that may find it difficult to obtain other sources of finance because of their poor credit rating.

1.2 Identify and discuss the range of long-term sources of finance available to businesses

1.2.1 Equity finance

Equity finance normally takes the form of ordinary shares and these denote ownership of the business. This is the primary risk capital as if the business fails, it is the last to be paid, conversely however if the business is a success it will receive the greatest benefit in the form of increasing dividends and share prices.

Preference shares also exist, but these tend not to denote ownership and receive a fixed return in the form of a set dividend. As the Preference dividend is paid before the Ordinary dividend, Preference shares are also sometimes referred to as prior charge capital.

Issuing equity finance will reduce the level of gearing and assuming the business expansion results in increased profits, interest coverage would also improve and financial risk would fall.

1.2.2 Debt finance

Debt finance takes the form of a long term loan which is normally secured on some of the organisations assets and receives regular interest payments. Thus compared to equity finance, debt finance is relatively low risk and so receives a commensurately low return. Debt is also referred to as debentures, bonds, loan stock and loan notes.

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1.2.3 Lease finance

Long-term **lease finance** is in the form of a finance lease where a lessee selects an asset which the lessor purchases and then leases to the lessee. Substantially all of the risks and rewards of ownership are transferred to lessee. Thus this is very similar to debt finance however the finance is provided for a specific (long term) asset.

1.2.4 Venture capital

Venture capital refers to higher risk finance provided by venture capitalist companies. This will normally take the form of an investment in ordinary shares and unsecured debt in an unlisted company for a period of around five years at the end of which time the venture capitalist will look for an exit route either by listing or selling the company. In this way they can realise their investment. The venture capitalist will normally insist on Board representation.

1.3 Identify and discuss methods of raising equity finance

1.3.1 Rights issue

- A **rights issue** is where a company offers further shares, at a fixed price which is normally below the current market price, to existing shareholders in proportion to their existing holding.
- This will reduce the level of gearing (as for any issuance of ordinary shares).
- It is possible to calculate what the share price will theoretically be immediately after the rights issue using a weighted average approach; this is known as the **theoretical ex rights price (TERP)**.
- The TERP is calculated before taking into account what use the proceeds will be put to.
- $$\text{TERP} = \frac{\text{Total share value before} + \text{proceeds from issuance} - \text{issue costs}}{\text{Total shares before} + \text{new shares issued}}$$

The value of a right

Shareholders may wish to sell their rights, instead of taking up their rights. The value of a right to a new share (which they could charge) = TERP – rights issue price.

If asked for the value of the right per existing shares divide the above answer by the number of existing shares that need to be held in order to be able to get a new share under the rights issue.

Evaluating the use of the proceeds of a rights issue

A common question that the examiner may pose is to evaluate the proposed use of the proceeds of a rights issue.

In order to do this, we need to:

(i) Calculate the TERP

(ii) Calculate the expected share price after the proceeds have been put to use (this may be via a P/E ratio given in the question).

(iii) Compare the TERP to the expected new share price.

(iv) If the expected new share price < the TERP, then shareholders will make a loss

(v) If the expected new share price > the TERP, then shareholders will make a gain

LECTURE EXAMPLE 5.1

White Spirit Co currently has 10m shares in issue (valued at a current share price of $2.40) and generated profits after tax of $2m in the last year.

White Spirit intends to raise $4.288m for a new investment opportunity via a rights issuance at a discount of 25% to the current share price. The issue costs are expected to be $212,000.

The board member proposing the project insists that the project will increase White Spirit's profits after tax by 15% and will not affect the price-earnings ratio of White Spirit (which is expected to remain constant).

(a) What is the theoretical ex rights price?

(b) What is the value of one right?

(c) Calculate whether the proposed use of the rights issuance funds will be financially acceptable to the shareholders of White Spirit Co

SOLUTION

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1.3.2 Private placing

A **placing** is where the shares are sold privately to clients of an issuing house at a fixed issue price. This is a relatively simple and cheap method of raising equity finance.

This will however dilute the ownership and control of existing shareholders but will not require security (unlike most debt) and will also reduce the level of gearing.

1.3.3 Public offers

A **public offer** is where shares are offered directly to the public either at a fixed price or by tender.

- **Fixed price offer**: This is where shares are offered directly to the public at a fixed price. The issuance may be underwritten (by an investment bank) in order to reduce the risk to the company of less than full subscription.
- **Offer for sale by tender**: This is where shares are offered to the public, but no fixed price is set. Instead, potential investors bid for shares with a striking price set based on demand. These issuances are often via an issuing house (investment bank) which will also underwrite the issuance and are rarer than fixed price offers.

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1.3.4 Stock exchange listing

A **stock exchange listing** is where a company has its shares listed on a recognised stock exchange by fulfilling certain criteria:

In the UK in order to obtain a listing on the main market a company must have at least a three year trading history, be worth at least £700,000 and at least 25% of the shares must be in the hands of the public.

Such shares have a secondary market i.e. they can be traded between individual shareholders, and this makes it considerably easier to issue further shares. It is common for companies to simultaneously obtain a listing and issue more shares – this is called an initial public offer (IPO)

1.4 Factors to consider when raising finance

Having identified the different sources of finance, the Examiner sometimes asks what **practical factors** should be considered before deciding on the source of finance to be used. Here it is worth considering matching, cost and capital providers.

1.4.1 Matching

A fundamental principle of financing is that the type/source of funds used should match the use of those funds. Matching can cover the following variables:

Duration – long term funds (e.g. mortgage) used to fund long term acquisitions (e.g. house purchase) and shorter term funds (e.g. three-year loan) used to finance shorter term items (e.g. car). A short term shortfall in day to day spending could be financed with an overdraft.

Currency – An investment in a foreign asset could be funded with a foreign source (e.g. currency loan, Eurobond issue, equity issue in foreign currency), which will reduce exposure to foreign exchange rate movements (covered in Chapter 7).

Pattern of cash flows – try to mirror the pattern of receipts from projects with the pattern of payments made on the finance. High risk projects where the potential returns are high but by no means certain, may be more suited to being financed with equity where returns are not obligatory. Projects with regular steady income may be able to support the use of debt finance.

1.4.2 Cost

Cost covers many areas and is an important factor when looking into raising finance. It is sensible to split this into issue costs and on-going servicing costs.

Issue costs will include the following:

- Arrangement fees
- Underwriting fees
- Prospectus printing costs
- Advisers' fees (e.g. merchant bankers, accountants, lawyers)

In general it is much cheaper to issue debt than shares in terms of the above issue costs.

The on-going servicing costs will include dividends with equity and interest payments with debt. Generally, required returns on equity will be higher than those on debt due to equity being the highest risk form of finance from the provider's point of view (see later in this chapter). Other on-going cost factors to consider include:

- Tax (interest is tax deductible for the company whereas dividends are not). This makes debt finance attractive.
- Reporting/Information provision required. If raising debt finance the banks/investors may well require regular information (e.g. monthly detailed accounts).

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1.4.3 Capital providers

Any existing or potential future capital provider's positions need to be assessed in terms of areas such as:

- Impact on gearing? (debt covenants, future borrowing capacity etc.)
- Impact on control? (new share issue will dilute control unless it's a fully subscribed rights issue)
- Impact on EPS?
- How much is needed?

As well as these factors you need to look at the current state of the market (is it a good time to be issuing shares? What about the "credit crunch"?) and the type of company; is it private or listed.

1.5 Islamic finance

Major difference between Islamic finance and the other forms of business finance

Islamic finance is consistent with the principles of Islamic (Shariah) law which prohibits the payment or acceptance of interest for loans.

The concept of "Riba" (interest) and how returns are made by Islamic financial securities (calculations are not required)

- The word "Riba" means excess, increase or addition and in the form of interest is forbidden by the Qur'an.
- Conventional banks aim to profit by accepting money deposits in return for the payment of interest and then lending money out in return for the payment of a higher level of interest.
- Islamic finance does not allow the use of interest - returns are made by sharing the profits and losses of the business with the finance providers. Islamic financial instruments include:

1.5.1 Trade credit (Murabaha)

- A Murabaha transaction involves a bank buying an asset and then selling on to a business for a marked-up price (agreed when purchase is made). The business will then pay the amount due in instalments.
- The overall idea here is that goods can be bought and then sold at a higher price to make a profit. These goods are then paid for with the mark-up element being paid for out of the profits.

1.5.2 Lease finance (Ijara)

- An Ijara transaction is the Islamic equivalent of a lease and works in exactly the same way as conventional leases except if it is a finance lease the lessor remains responsible for major maintenance and insurance costs. The use of the asset will be specified in the contract.
- The reason such leases are allowed is because the payments being made by lessee, are rental payments not interest payments i.e. the asset is being rented from its owner.

1.5.3 Debt finance (Sukuk)

- A Sukuk transaction is where a business asset with a life of three to five years is bought and paid for by a third party or parties. The business then uses this asset to earn profits which it then shares with the third party or parties (i.e. there is no interest).
- If the asset makes a loss, this is also shared with the third party or parties.

1.5.4 Equity finance (Mudaraba)

- A Mudaraba transaction is a partnership between a partner who provides the capital and another partner who provides the time, skill and expertise required by the business. The partners share in any profits made by the business and the capital provider suffers any losses.
- Interest cannot be charged for the capital invested.

1.5.5 Venture capital (Musharaka)

- A Musharaka transaction is where two or more partners provide both the capital and the time, skill and expertise required by the business.
- These partners all share in the profits in a ratio agreed in their original contract. Losses are always shared in proportion to the capital contributions.

1.6 Identify and discuss internal sources of finance

Retained earnings

A company ultimately exists for the benefit of its shareholders and so when it makes money, it is the shareholders' money. However a company does not have to hand this money over to its shareholders; it can instead keep and invest these funds.

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Such funds are described as **retained earnings**. These should not be confused with retained profits, as you can only invest the cash that retained profits generate!

Increasing working capital management efficiency

We saw in Chapter 3, that working capital requires an investment of funds, however if the amount of working capital can be reduced then the corresponding level of investment will also be reduced and the cash released can be used to invest elsewhere in the business.

2 The relationship between dividend policy and the financing decision

The **dividend policy** is the decision over how much of the money that the company has made should be paid out to its shareholders. Paying a bigger dividend has two impacts on the financing decision:

- The company will have less money left and is thus more likely to face capital rationing or to have to raise more finance;
- The shareholders will have received more income from their investment and are thus more likely to be prepared to invest further.

Having said this, the issuing of more shares will incur issue costs and so most companies that require further funding tend to pay lower dividends.

2.1 Theoretical considerations for dividend policy

There are two main theories with regards to the dividend decision:

(1) Residual theory

Dividends are paid out only after all projects with a positive NPV have been financed. Whatever cash is left (i.e. the residual amounts) is returned to shareholders as a dividend. This would seem to be consistent with the concept of trying to maximise shareholder wealth but can lead to an erratic dividend.

(2) Irrelevancy theory

American economists Modigliani & Miller stated that the pattern of dividends paid by a company is irrelevant in a tax-free world, based on the following logic:

- A company will always invest in positive NPV projects.
- If the company can't invest in a certain project out of its retained earnings (due to a dividend having been paid out), then it will need to raise funds from other sources (which M&M assume will always be possible for positive NPV projects).
- This will potentially lead to existing shareholders receiving proportionately less of the returns from the new project, but this loss will be offset by the dividend they are receiving now.
- Hence, the ultimate pattern of dividend payments is irrelevant.

Modigliani and Miller stated that if a firm's dividend policy was not to the taste of shareholders, the shareholders could take action:

- If the dividend is lower than desired, simply sell a few shares to create some extra income to replicate an increased dividend (a 'manufactured dividend')
- If the dividend is higher than desired, simply use the 'excess' dividend to buy some additional shares.

In reality, tax and transaction cost implications means this logic is flawed.

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2.2 Practical considerations for dividend policy

In practice, there are other influences which need to be considered.

2.2.1 Shareholder expectations (Clientele Effect)

The directors propose the level of dividend; the shareholders either accept it and are paid or reject it and receive nothing. Having said this, the shareholders select the directors and so the directors will generally try to fulfil their shareholders expectations. These expectations will be significantly influenced by historic dividends.

- Companies attract shareholder because of their historic dividends on the expectation that these patterns will continue in the future (shareholders may favour the existing policy due to tax preferences for income vs. capital gains, or the need for cashflow).
- This is known as the clientele effect.
- If a company changes its dividend policy, then existing shareholders may seek to sell their shares (causing the share price to fall) and reinvest in companies whose dividend policies meet their needs.

2.2.2 Signalling

In Chapter 6 you will see how investors do not have perfect information and capital markets are, at best, semi-strong efficient. Hence, investors will look for information contained in dividend announcements and react to it, causing share price movements:

- If a company cuts its dividend, investors may interpret this as a sign of bad news and seek to sell their shares, leading to a reduction in share price
- If a company increases its dividend, investors may interpret this as a sign of improved future prospects and purchase shares in the company, increasing the share price.

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2.2.3 Legal constraints

Legally a dividend can only be paid from accumulated profits. A dividend can exceed this year's profit only if the company has sufficient retained profit from previous years.

2.2.4 Liquidity

The dividend is an optional cash outflow, which by definition reduces the liquidity of the company. Thus a dividend should only be paid if the company is left with or has access to sufficient cash to remain solvent.

2.3 Alternatives to cash dividends

As the dividend is proposed by the directors who are viewed as being the most knowledgeable about their company's present and future prospects; the dividend also sends a signal to the market which will influence the share price.

If a company does not want to pay a cash dividend, the following alternatives are available:

(a) Scrip dividend

A scrip dividend is a dividend paid by the issue of additional company shares, rather than by cash. It is offered *pro rata* to existing shareholdings.

From a company point of view this has the advantage of preserving a company's cash position if a substantial number of shareholders take up the offer and will decrease the company's gearing (due to retained profits remaining higher), and may therefore enhance its borrowing capacity.

There are also disadvantages of scrip dividends. Assuming that dividend per share is maintained or increased, the total cash paid as a dividend will increase in the future. Scrip dividends may also be seen as a negative signal by the market i.e. the company is experiencing cash flow issues.

(b) Share repurchase

The company pays cash to the shareholders in return for a proportion of their shares. This could be used to change the capital structure of the company (see later in this chapter).

(c) Concessions

Shareholders are given concessions if they use the company's products or services e.g. Original Eurotunnel shareholders could travel at reduced fares.

3 Estimating the cost of equity

After having raised finance, a company must decide what to invest in.

When appraising potential investments, directors will need to determine a cost of capital (the minimum return required when using the company's funds).

An important component of this is the company's **cost of equity** – the minimum return that shareholders require from the funds they have invested in the company.

- There are two ways of estimating the cost of equity that we will see – the **dividend growth model** and the **capital asset pricing model**.

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3.1 The dividend growth model

The dividend growth model is a formula which calculates the current price of a share as the present value of a stream of constantly growing dividends (valuing them as a growing perpetuity discounted at the cost of equity).

FORMULA GIVEN IN EXAM

$$P_o = \frac{D_o(1+g)}{(r_e - g)}$$

Where:

P_o = Current ex-div share price
D_o = Current dividend
g = Constant growth in dividends
r_e = Return on equity or the cost of equity

We can then rearrange this formula to calculate the cost of equity:

$$r_e = \frac{D_o(1+g)}{P_o} + g$$

- Share prices can be quoted Cum div, meaning the current price includes the right to the upcoming dividend i.e. the dividend is about to be paid, and Ex div, meaning the current price excludes the right to the upcoming dividend i.e. the dividend has just been paid.

LECTURE EXAMPLE 5.2

Lano Co has just paid a dividend of 25 cents on its ordinary shares which have a market value of $3.75. The constant dividend growth rate is 9%.

What is the cost of equity for Lano Co?

SOLUTION

The weaknesses of the dividend growth model are as follows:

- It is too simplistic as most companies do not pay a constantly growing dividend
- Identifying an ex-div share price is difficult for listed companies and very difficult for unlisted companies and so the model is based on estimates

Estimating growth

Often, the growth rate (g) is not provided so we can use one of two methods to estimate this:

(1) Annualising growth as a **geometric average** of the historical dividend stream

(2) The **earnings retention** method

FORMULA GIVEN IN EXAM

$$g = br_e$$

Where:

b = The proportion of earnings retained and reinvested

r_e = The % return earned on those investments

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ILLUSTRATION 5.1

Growth Co has just paid a dividend of 25c per share from earnings per share of $1.00. The dividend has grown from 18c four years ago. The company has a target return on capital of 12%. Its share price is currently $2.50. Calculate the Cost of Equity (Ke) using both methods.

SOLUTION

(a) We assume that there has been compound growth over the four-year period:

$18 \times (1+g)^4 = 25 \quad \therefore g = 8.56\%$

$$k_e = \frac{25\,(1.0856)}{250} + 0.0856 = 19.4\%$$

(b) If a dividend of 25c has been paid from earnings of $1.00, then b = 0.75/1.00 = 75% and r = 12%

growth = 75% × 12% = 9% p.a.

$$k_e = \frac{25\,(1.09)}{250} + 0.09 = 19.9\%$$

3.2 The capital asset pricing model (CAPM)

If a share price is not observable, an alternative way to calculate the cost of equity is by using the **Capital Asset Pricing Model (CAPM)**.

CAPM uses the principle that the return required by an investor is in proportion to the riskiness of the investment.

Hence, when determining the return required, we must consider the **business risk** of a the company (the variability of the PBIT of the company due to the nature of its operations)

Business risk is composed of two elements:

- **Specific business risk** (also called unsystematic risk)
  - These are risks specific to the company which affect it uniquely and may be diversified away.
  - These include e.g. equipment failure, labour strikes, and product faults.
- **Systematic business risk**
  - This is the exposure of the company to macro-economic factors which impact all businesses to some degree and cannot be diversified away (e.g. exposure to changes in gross domestic product, interest rates, inflation, FX rates and commodities prices).
  - Exposure to these risks is driven by the business sector of the company and is increased by e.g. operational gearing and is measured by β (see later).

The main assumption of CAPM is that shareholders in a company own a portfolio of shares in uncorrelated companies and that due to this their **exposure to specific risk has been diversified away** (as if one of their shareholdings performs worse than expected due to specific risk factors, it will be offset by another shareholding performing better than expected).

Because of this, the shareholders are only concerned by the impact of a new investment on their exposure to **systematic risk**, as measured by a **β factor** (calculated by comparing the change in the return on an individual share to the change in return on a stock market index in the same period).

This β factor for a company, individual investment or project is then used in the CAPM formula to give a measure of the shareholders' required return (**the cost of equity**) to compensate them only for the systematic risk they are facing.

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FORMULA GIVEN IN EXAM

$$E(r_i) = R_f + \beta_i (E(r_m) - R_f)$$

Where:

$E(r_i)$	= Expected return on a share called 'i' or the cost of equity of share 'i'
R_f	= Risk free rate of return, often taken as the return on short term Government Bonds
β_i	= Beta, which is a measure of the systematic risk in share 'i'
$E(r_m)$	= Expected return on the market portfolio (e.g. the return on stock indices like FTSE100)
$(E(r_m) - R_f)$	= Equity risk premium

- CAPM calculates the required return by starting with the risk free return which can be obtained without being exposed to any risk at all.
- This is then increased by the systematic risk premium based upon the excess of the market return over the risk free return. In other words:

  Required return = Risk free return + Premium for the risk being taken

LECTURE EXAMPLE 5.3

Drewboy Co has a beta value of 1.5. The average return on the market is currently 17% and risk free investments are paying a return of 5%.

What is the cost of equity for Drewboy Co?

SOLUTION

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Advantages and disadvantages of the CAPM

The **advantages** of CAPM are:

- It directly links risk and return
- It can be used to calculate the cost of equity when the dividends are not growing constantly

The **disadvantages** of CAPM are:

- It can only be used when the investors are diversified
- It assumes that all of the components will remain constant and the same as they have been historically
- It assumes that investors can invest and borrow at the risk free rate
- It assumes that the capital markets are perfect i.e. no transaction costs, no tax and no dominant investor
- It assumes that the risk of all macroeconomic variables can be grouped into one measure

We will see later on that the β factor used will need to be adjusted if there are changes in:

- Business risk
- Gearing (financial risk)

4 Estimating the cost of debt

If a company is geared, then its directors will need to also need to consider the cost of their debt finance when determining their overall cost of capital.

If the future cashflows on a debt instrument are discounted at the cost of debt, then the resulting present value will be the current market value of the debt. This is the technique that will be used to find the cost of debt where we have been given the market value of the debt.

This process will vary depending on the type of debt.

4.1 Irredeemable debt

Because irredeemable debt doesn't redeem, the only future cashflows are the interest payments on the debt (which, per chapter 4, need to be evaluated post-tax).

Hence, irredeemable debt represents a perpetuity of interest payments and can be valued as such:

- $P_o = \frac{I(1-T)}{Kd}$

If we are given the market value of the debt, then we can re-arrange the formula to solve for the cost of debt:

- $K_d = \frac{I(1-T)}{P_o}$

Where:

K_d = Cost of debt
I = Interest
T = Corporation tax rate
P_o = Current ex-interest debt price

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LECTURE EXAMPLE 5.4

Hammered Co has some $100 nominal value 6% irredeemable debt which currently has a market value of 84% ex-interest. The corporation tax rate is 30%.

What is the cost of debt for Hammered Co?

SOLUTION

4.2 Redeemable debt

The cost of redeemable debt capital is more complex, as the future cashflows will include both interest and redemption payments.

- It is still the case that we will be given a market value for the debt and then we will be required to find the discount rate at which the present value of the future cashflows = the market value.
- This is achieved by calculating the IRR (see Chapter 4) of the redeemable debt cash flows

Timing	Cash flow
	$
0	(P_o)
1 – n	I(1 –T)
n	R_v

Where:

R_v = Redemption value at time n

LECTURE EXAMPLE 5.5

Plastered Co has some $100 nominal value 4% redeemable debt which currently has a market value of 75% ex-interest. This debt will be redeemed in seven years' time at a 12% premium and the corporation tax rate is 35%.

What is the cost of redeemable debt for Plastered Co?

SOLUTION

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4.3 Convertible debt

Convertible debt is similar to redeemable debt however at the end of the debt's life it can either be redeemed or converted into a certain number of ordinary shares.

This is the debt holder's decision and will depend upon the value of the shares compared to the redemption value.

- If you are not told the expected market value of the ordinary shares at the time of conversion, it can be estimated as follows, using the expected dividend growth rate:
  - MV now × $(1+g)^n$ = MV in n years' time
- The redemption cashflow will then be included as the higher of redemption at par and the value of the conversion
- The cost of debt is then the IRR of the future cashflows and the current market value (as for redeemable debt).

ILLUSTRATION 5.2

Sozzled Co has some $100 nominal value 6% convertible debt which currently has a market value of 88% ex-interest. This debt will be redeemed in four years' time at par or converted into 20 ordinary shares. A financial expert has forecast that Sozzled's shares will be worth $5.10 in four years' time. The corporation tax rate is 40%.

What is the cost of the convertible debt for Sozzled Co?

SOLUTION

So in four years' time the debt can either be redeemed for $100 or converted into shares which will be worth 20 × $5.10 = $102 and so the debt will be converted.

I = $6
T = 0.40
P_o = $88
R_v = $102

Timing	Cash flow	Discount factor	Present value	Discount factor	Present value
	$	10%	$	5%	$
0	(88)	1.000	(88)	1.000	(88)
1 – 4	6(1 – 0.40)	3.170	11.41	3.546	12.77
4	102	0.683	69.67	0.823	83.95
			$(6.92)		$8.72

IRR $\approx 0.05 + \frac{8.72}{8.72-(6.92)} \times (0.10 - 0.05)$

$= 0.08$

So the cost of convertible debt for Sozzled Co is 8%.

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4.4 Preference shares

Preference shares are similar to ordinary shares except the dividend is constant and so there is no growth. Thus the **cost of preference share capital** can be calculated by using the following formula:

$$K_p = \frac{D_o}{P_o}$$

LECTURE EXAMPLE 5.6

Razzled Co has just paid a dividend of 20 cents on its preference shares which have a market value of $1.90.

What is the cost of preference share capital for Razzled Co?

SOLUTION

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4.5 Bank debt

Unlike other forms of debt finance, bank loans have a variable rate of interest, which means that the market value always equals the nominal value and the **cost of bank debt capital** can be calculated by using the following formula:

$$K_b = \frac{I(1-T)}{P_o}$$

LECTURE EXAMPLE 5.7

Blotto Co has a bank loan that is currently charging 8% interest and the corporation tax rate is 25%.

What is the cost of bank debt capital for Blotto Co?

SOLUTION

5 The weighted average cost of capital (WACC)

As we have seen, the different sources of finance in a company have different costs.

- Hence, when appraising new projects/investments to be funded out of the overall pool of funds, we need to use a **weighted average cost of capital (WACC)** that takes into account the required return of all of the different investors in the company.

FORMULA GIVEN IN EXAM

$$WACC = \left(\frac{V_e}{V_e+V_d}\right)K_e + \left(\frac{V_d}{V_e+V_d}\right)K_d(1-T)$$

Where:

V_e = Total value of the equity
V_d = Total value of the debt
K_e = Equity cost of capital
K_d = Debt cost of capital
T = Corporation tax rate

Note. The total equity and debt values can either be calculated using book values or market values, though market values give a better indication of the current cost of capital.

Note. This formula assumes that tax has been ignored in calculating K_d, however as tax has to be included when calculating the cost of redeemable debt, it is much easier to always include tax when calculating the cost of debt and then ignoring it when using this formula.

This formula also assumes that the organisation only has two sources of finance; if it has more the formula can be extended by adding the extra source and its market value. So if an organisation was financed with ordinary shares, preference shares and debt; the formula would look as follows:

$$WACC = \left(\frac{V_e}{V_e+V_p+V_d}\right)K_e + \left(\frac{V_p}{V_e+V_p+V_d}\right)K_p + \left(\frac{V_d}{V_e+V_p+V_d}\right)K_d(1-T)$$

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LECTURE EXAMPLE 5.8

SCS Co is financed with a mixture of equity and debt. It has just paid a dividend of 45 cents on its 4.5 million ordinary shares which have a market value of $5.25. The constant dividend growth rate is 6%. The 7% irredeemable debt currently has a market value of 83% cum-interest. The corporation tax rate is 35%. An extract from SCS's statement of financial position shows the following:

	$
Debt	10,000,000
Shareholders' funds	19,450,000

What is the WACC using book value and market value weightings for SCS Co?

SOLUTION

6 Sources of finance and their relative costs

6.1 The relative costs of equity and debt (risk vs. return)

Risk and return are connected; as the risk rises so the required return increases and so the relative costs rise.

Equity is the primary risk capital and, hence, the most expensive source of capital, as:

- If the business fails, it is the last to be paid
- The returns it receives (dividends) are also uncertain (as they are discretionary).

Debt is a less risky and hence cheaper source of capital, as:

- It is generally secured
- The returns it receives are more certain (interest is not discretionary)
- It may be redeemable
- Debtholders are the first to be paid should the business fail
- Finally, tax makes the debt even cheaper from the businesses point of view (per Chapter 4)

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6.2 The creditor hierarchy (and its impact on risk and return)

The creditor hierarchy refers to the order creditors are paid when a business becomes insolvent and is as follows:

(1) Secured Creditors e.g. fixed charge over a non-current asset
(2) Preferential Creditors e.g. pension schemes and employees
(3) Floating Charge Holders e.g. charge over the current assets
(4) Unsecured Creditors e.g. trade payables and the Crown
(5) Preference Shareholders
(6) Ordinary Shareholders

- As a creditor moves down the above list they are exposed to greater risk and so require a commensurately greater return. Hence the cost of the source of finance increases.

6.3 Gearing and financial risk

Gearing refers to the level of debt used to finance a business and can be measured using the ratios seen in Chapter 1 (Financial Position).

High levels of gearing mean the organisation has high levels of debt and so is committed to high levels of interest payments which must be made regardless of how the business is actually performing.

Hence, increased gearing leads to increased **financial risk** (the variability in PAT due to the level of fixed interest payments on debt in the company), which is concerning for shareholders, as there will be a greater amount of fixed payments that will need to be made before a dividend can be paid.

Hence, **as gearing increases**, so does the risk for shareholders and hence **the cost of equity increases**.

7 Capital structure theories and practical considerations

7.1 Explain the relationship between company value and cost of capital

A company's value is the present value of all of its future cash flows discounted at its cost of capital (WACC). Hence, companies can maximise their value by attempting to minimise their WACC.

Theories as to how to minimise the WACC are presented below:

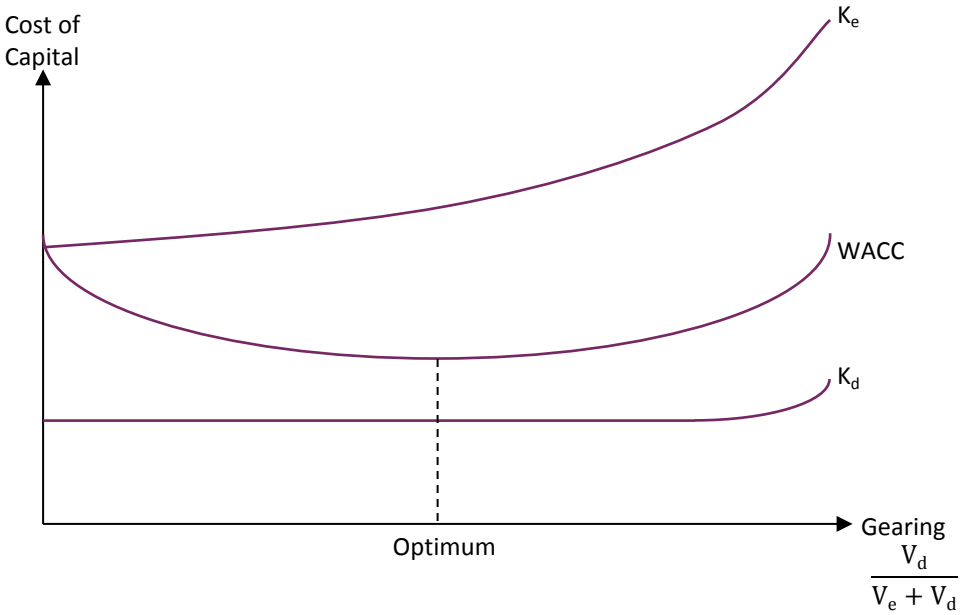
7.2 The traditional view of capital structure

We have just seen that debt is cheaper than equity and that introducing debt increases the risk for shareholders and so the cost of equity. So is having cheaper debt and more expensive equity a good or bad idea overall? The **traditional view** of capital structure states that:

- Introducing debt starts off by being a good thing as the WACC falls because the increase in the cost of equity is relatively small compared to the benefit of the increase in cheap debt.
- However as the level of debt increases further, the cost of equity starts to rise faster, outweighing the benefit of the extra cheap debt, resulting in the WACC also rising.

Note: At very high levels of gearing, even the cost of debt starts to rise.

The traditional view can be depicted graphically as follows:



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It can be seen from the above graph that the traditional view suggests that there is an optimum capital structure where the WACC is at a minimum.

The traditional view makes the following assumptions:

- Operating profits are constant
- There are no transaction costs on issuing finance
- Business risk is constant
- All earnings are paid out as dividends

Unfortunately, the traditional theory doesn't tell us where the optimum WACC is reached. Hence trial and error must be used to find the this point

7.3 Modigliani & Miller's view of capital structure 1958 (no tax)

The economists Modigliani & Miller made the following assumptions in their initial view of capital structure:

- Capital markets are perfect
- Investors are rational and risk averse
- There are no transaction costs
- Debt is always risk free
- There is no taxation

The no taxation assumption is particularly important as this removes the tax benefit of paying interest and means that the total payments to investors will be the same for equivalent companies with and without debt:

	No Interest Co			Interest Co		
Year	**1**	**2**	**3**	**1**	**2**	**3**
	$	$	$	$	$	$
Earnings	800	1,600	400	800	1,600	400
Interest	nil	nil	nil	(100)	(100)	(100)
After tax earnings	800	1,600	400	700	1,500	300
Debt holders' return	nil	nil	nil	100	100	100
Equity holders' return	800	1,600	400	700	1,500	300
Total investors' return	800	1,600	400	800	1,600	400

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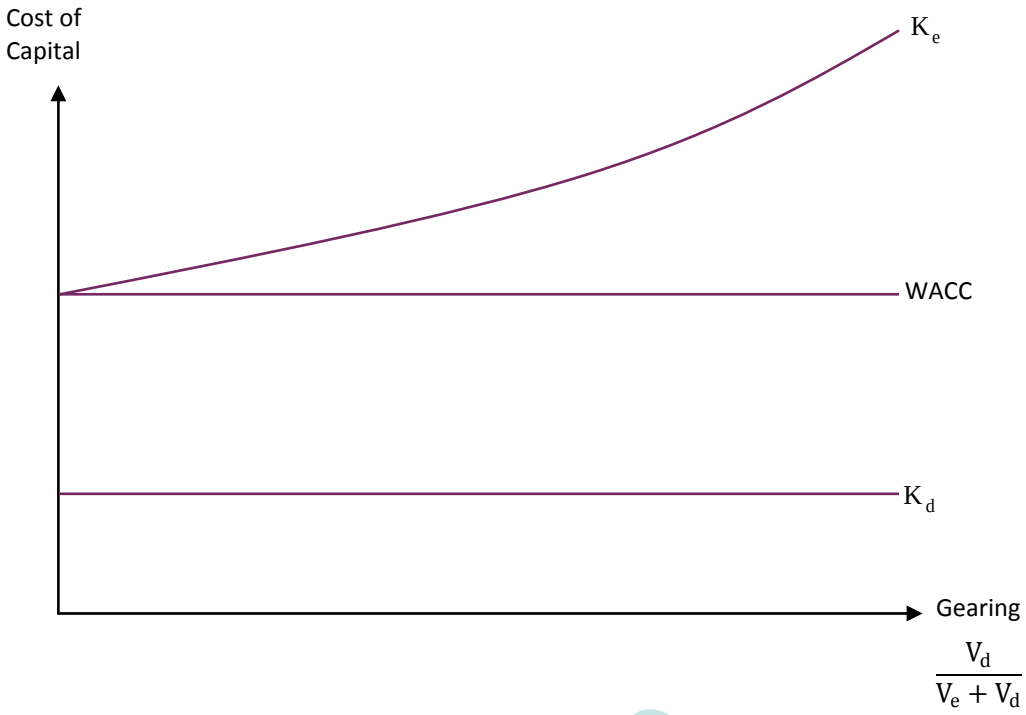
This in turn means that these comparable companies must also have the same total market value and hence the same WACC.

M&M's initial views can be summarised as:

- As debt is introduced, the cost of equity rises
- Without any tax saving on interest payments, the benefit of the extra cheap debt is only enough to offset the increased cost of equity
- Hence the WACC remains unchanged and there is no optimal capital structure

The Miller and Modigliani view without corporate taxation can be depicted graphically as follows:



This view was criticised because the no taxation assumption is unrealistic.

7.4 Modigliani & Miller's view of capital structure 1963 (with tax)

If the no taxation assumption is removed then the tax benefit of paying interest is reintroduced and this means that the total payments to investors will be higher for the equivalent company with debt:

	No Interest Co			Interest Co		
Year	**1**	**2**	**3**	**1**	**2**	**3**
	$	$	$	$	$	$
Earnings	800	1,600	400	800	1,600	400
Interest	nil	nil	nil	(100)	(100)	(100)
	800	1,600	400	700	1,500	300
Tax @ 30%	(240)	(480)	(120)	(210)	(450)	(90)
After tax earnings	560	1,120	280	490	1,050	210
Debt holders' return	nil	nil	nil	100	100	100
Equity holders' return	560	1,120	280	490	1,050	210
Total investors' return	560	1,120	280	590	1,150	310

This in turn means that the company with debt must also have a higher total market value and hence a lower WACC.

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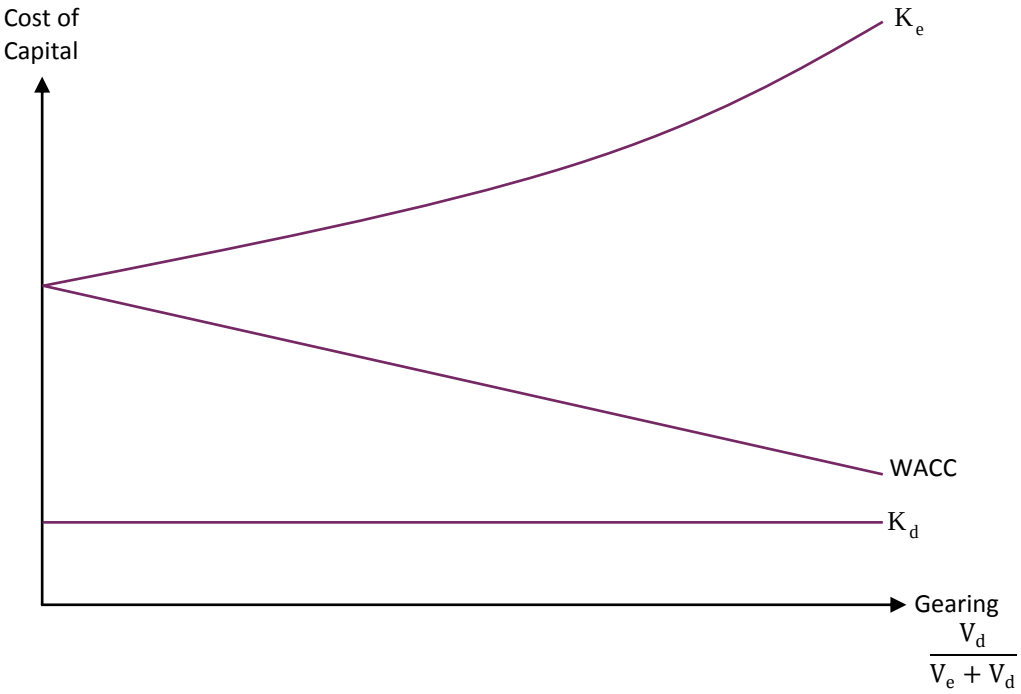
The Miller and Modigliani view with corporate taxation can be depicted graphically as follows:



7.5 Capital market imperfections and their impact on M&M

In the real world capital markets are not perfect and suffer from the following imperfections:

- Companies cannot always raise finance when required (hard capital rationing) and so there is a risk of bankruptcy. This risk increases as the level of gearing increases and so this deters companies from having high levels of debt.
- Debt is not always risk free, especially at high gearing levels and so the cost of debt will rise as debt increases and so the WACC will stop falling and start to rise at some point. (Traditional view!)
- The tax saving on interest payments only exists while the company has sufficient pre-interest profits. Once the interest payment exceeds pre-interest profit (known as tax exhaustion), there is no longer any benefit from increasing the level of debt finance.

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8 Changes to a company and their impact on the WACC

8.1 When we should use the WACC

The WACC reflects the company's existing business risks and capital structure (financial risks), hence we may use the current WACC to appraise new projects so as long as:

- The new project has the same business risk as our existing operations
- There will be no change in the long term capital structure of the company
- The project is relatively small (so its NPV won't have a significant effect on MV of equity)
- We are not using project specific finance (e.g. a government grant which is tied to this specific project).

8.2 What to do if the situation changes?

As discussed above, if the capital structure or business risk changes, then the old WACC will no longer be appropriate to use to appraise new projects, hence a new WACC will need to be calculated.

8.2.1 A change in capital structure

If the long term gearing of the company changes, then so will its cost of equity (and hence its WACC).

In order to calculate the revised cost of equity, we will need to use the CAPM formula with a revised β (to reflect the change in financial risk in the company).

- If a company was previously ungeared, its previous β is referred to as an **'asset beta'** or **'β_a'**.
- We now need to find a new β for the same company (whose business risk has not changed) that reflects the increased financial risk of the increased gearing; this is called the **'equity beta'** or **'β_e'**.
- You will find that β_e is greater than β_a as financial risk increases a company's exposure to systematic risk
- The equity and asset betas are linked by the following formula:

FORMULA GIVEN IN EXAM

$$\beta_a = \left(\frac{V_e}{(V_e + V_d(1-T))}\beta_e\right) + \left(\frac{V_d(1-T)}{(V_e + V_d(1-T))}\beta_d\right)$$

Where:

β_a = Asset beta or the ungeared beta
β_e = Equity beta or the geared beta
β_d = Debt beta

Note: The debt beta measures the risk of the company's debt, which we assume is zero unless the question specifically says otherwise (this means that the company can borrow at the risk free rate of return).

If we assume $\beta_d = 0$, then the formula can be simplified and presented as follows:

- $\beta_a = \left(\frac{V_e}{(V_e+V_d(1-T))}\beta_e\right)$
- $\beta_e = \beta_a\left(\frac{V_e+V_d(1-T)}{V_e}\right)$

Hence, the steps to follow are:

(1) Un-gear the company's equity beta to obtain an asset beta;

$$\beta_a = \left(\frac{V_e}{(V_e+V_d(1-T))}\beta_e\right)$$

(2) Calculate the new β_e for the company (based on the new debt to equity ratio given)

$$\beta_e = \beta_a\left(\frac{V_e+V_d(1-T)}{V_e}\right)$$

(3) Use the CAPM formula with the new β_e to calculate the new cost of equity

(4) Use the **new cost of equity** and new debt to equity ratio to find a new WACC

(5) Use this **new WACC** to evaluate new projects

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8.2.2 A change in business risk

If a company invests in a new project in a new business sector, it will be exposed to new business risks.

Hence both a new cost of equity and WACC will need to be calculated to appraise the project.

The steps in calculating a new project specific cost of equity using CAPM are as follows:

(1) Locate a suitable proxy company (operating in the new industrial sector);

(2) Find the equity beta of the proxy company alongside its gearing and tax rate;

(3) Un-gear the proxy company's equity beta to obtain an asset beta for the new industrial sector

$$\beta_a = \left(\frac{V_e}{(V_e + V_d(1-T))}\beta_e\right)$$

(4) Re-gear the asset beta using our company's gearing;

$$\beta_e = \beta_a\left(\frac{V_e+V_d(1\text{-}T)}{V_e}\right)$$

(5) Use the new equity beta and the CAPM formula to calculate a **project specific cost of equity**.

(6) Use this cost of equity to calculate a new **project-specific WACC.**

LECTURE EXAMPLE 5.9

Millie Mo Co produces bread and is financed with 43% debt. It is now appraising a new project which will involve producing cakes and will be financed from its existing capital. It has obtained beta factors for a number of different companies as follows:

Name	Business	Debt finance	Beta
Millie Mo Co	Bread	43%	1.34
Huckleberry Co	Jam	28%	1.30
Fletch Co	Cakes	32%	1.36
Jo Jo Co	Bread	28%	1.12
Sally Co	Currents	43%	1.52
Thumb Co	Jam	35%	1.40

The average return on the market is currently 18% and risk free investments are paying a return of 4%. Tax is 30%.

What is the cost of equity that should be used in a WACC calculation to identify a project specific discount rate for Millie Mo's new project?

SOLUTION

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8.2.3 Marginal cost of capital approach

An alternative approach to take if business risk and the capital structure change as a result of a new project is to consider the marginal cost of capital when appraising the new project.

The marginal cost of capital represents the incremental cost of raising the new finance, factoring in the cost of the new finance and the change in the return required by the existing investors on the existing finance as the risks they face are changed by the project.

For example:

- If a company funds a new project by issuing new equity finance (and permanently changing its capital structure) then its WACC will likely increase (as equity is more expensive than debt).
- Previous projects will have been appraised using the old WACC (which was lower)
- Considering the marginal cost of capital in appraising the new project will factor in both the risks presented by the new project and the increased return required on the previous projects.

8.3 Pecking order theory and the selection of sources of finance

Pecking order theory states that firms will select finance in a particular order, only moving down the list if there is insufficient finance at the earlier level; rather than considering the overall cost of capital. The pecking order is as follows:

(1) Retained earnings: this is the easiest, quickest and cheapest (in terms of issue costs) way to raise finance.

(2) Debt: this is relatively cheap to service and issue and can be interpreted as a sign of management confidence.

(3) Convertible debt: this offers investors the potential to benefit, at the expense of the shareholders, if the company does well.

(4) Preference shares; this offers an equity stake without the uncertainty of dividend levels.

(5) Ordinary shares: this is time consuming to arrange and expensive to service and if unsuccessful leads to a general loss of confidence and accompanying fall in share price of the company.

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9 Finance for small and medium sized entities (SMEs)

9.1 Financing needs of small businesses

The financing needs of small businesses are no different from larger businesses but the absolute amounts required will be less. Small businesses will also often be offered less credit from suppliers. Thus small businesses will need a mix of short, medium and long term finance.

9.2 Financing problems for small businesses

The **nature of the financing problem for small businesses** is as follows:

(1) **The funding gap** results from the difficulties small businesses face in raising the finance they require. This is because such businesses are higher risk due to their limited track record and dependency on a very small number of key employees

(2) **The maturity gap** results from the fact that most of the finance that small businesses are able to raise will be short term in nature and this will not match with the investments being made.

(3) **The inadequate security** results from most small businesses having very little in the way of traditional non-current assets to offer as security to potential lenders to help reduce their risk

9.3 Appropriate sources of finance for SMEs

Sources of finance	Financial impact
Owners investment – equity and/or debt	This tends to form the initial source of finance and in the short term requires very little return, however in the longer term the original owners will wish to realise their investment.
Overdraft	This is designed as a short term source of finance, though many SMEs find it becomes increasingly permanent. As a result the bank may insist on converting part of the overdraft into a loan. Due to the fact that overdrafts are repayable on demand; this puts the bank in a very influential position.
Bank loans	This offers greater certainty but the repayments must be met.
Supplier credit	This is an extremely important part of working capital funding and tends to grow over time as the SME becomes more established and builds its relationship with its suppliers.
Debt factoring	This uses the receivable current assets as security to raise short term finance.
Leases	This helps with acquiring the use of particular assets
Business Angel funding	This is funding from individuals who have already made a lot of money normally in the same industry. Thus they tend to be well informed and are often prepared to invest for the longer term.
Venture capital	These provide medium term funding where they believe the business will be successful and grow significantly. They will normally want significant influence over the business and a potential exit route in around five years,
Supply chain financing	Introduced in 2012, this scheme allows SME's to potentially access finance (usually in the form of an advance by a bank) when a large organisation which is a customer of the SME has vouched for the income of the SME. The bank accepts the credit rating of the large organisation as evidence that the SME's sales invoice will be paid.
Crowdfunding	This involves raising finance from a large number of investors who each only have to provide a small portion of the finance. This has become popular as websites and social media make it possible to access many potential investors quickly.
Peer-to-peer financing	This involves borrowing and lending between unrelated individuals (peers) without using a traditional financial intermediary. This is usually organised via a peer-to-peer company's website.

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Sources of finance	Financial impact
Government assistance	Governments tend to provide varying forms of assistance to SME's ranging from tax incentives through to specialist schemes such as: ▸ The Loan Guarantee Scheme offers a guarantee by the Government for the bulk (80% to 85% maximum) of the loan. The SME pays an annual premium but as result the risk is greatly reduced from the lenders point of view (70-85% of loan amounts up to £100,000) and so funding is far more forthcoming. There is a large amount of administration involved in this scheme. ▸ Regional Selective assistance (In the UK assistance may be available for projects involving up to £0.5m capital expenditure), ▸ Enterprise grants (Selective scheme for firms employing fewer than 250 people), ▸ Regional innovation grants (grants for developing new products/processes in certain geographical locations up to a maximum of £25,000), ▸ Training loans (loans with deferred repayment for vocational courses up to a maximum of £125,000) ▸ The Enterprise Investment Scheme (EIS) offers tax incentives to outsiders who invest in the ordinary shares of unquoted companies. ▸ Venture Capital Trusts (VCT) offers tax relief's to investors when the trusts invest a large proportion of their assets in unquoted companies. These are just some of the features of a select number of schemes.

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6

Business valuations

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1 Nature and purpose of the valuation of business and financial assets

1.1 Reasons for valuing businesses and financial assets

There are several reasons for valuing businesses and financial assets as follows:

- For tax reasons – inheritance, capital gains and income taxes can all require business and financial asset values.
- For legal purposes – if business and financial asset are being used as loan collateral or as part of an estate valuation in matrimonial disputes
- For commercial reasons – if business and financial asset are being bought or sold or if a business is being floated on a stock market. This is the mostly likely reason for performing a valuation in this paper.

1.2 Information requirements for valuation

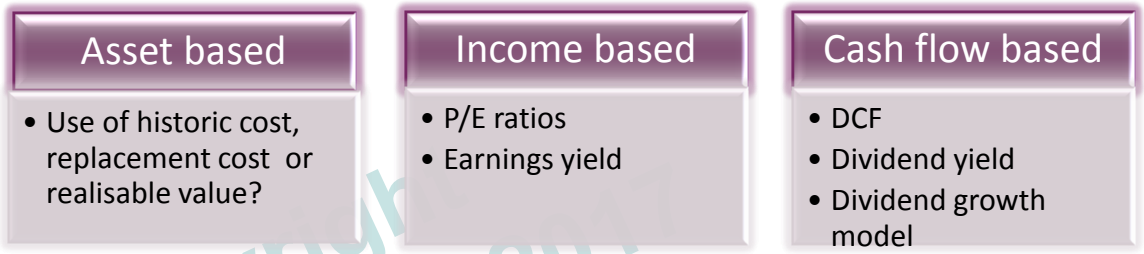
Information requirement	Limitations
Size of holding: the more significant the holding the greater the value per share	The size of the holding on its own does not give the full picture. If you own 10% of a company and the remaining 90% is all owned by one individual; your 10% is not significant. However if you own 10% and the next biggest shareholder owns 1%, your 10% is very significant.
Details of the parties involved and the circumstances of the transaction	The parties and circumstances are likely to be unique for each such transaction and so this information will not necessarily be that helpful.
Copies of the Articles of Association, specifically any clauses related to such transactions	The Articles of Association can be changed by the shareholders and so may not be relevant.

Information requirement	Limitations
Details of past transactions	Many factors change over time and so past transactions do not necessarily reflect current circumstances.
Recent published accounts	These could both be out of date and could have been prepared with this transaction in mind.
Financial projections and market outlook	These will always be partly based on subjective judgements and opinions and may not be that realistic.
Valuations of similar listed companies	Identifying similar listed companies can be difficult and even when successful, listing increases the value of a company.

2 Models for the valuation of shares

2.1 Methods of valuation

There are generally considered to be three main groups of valuation techniques, these are as follows.



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In addition, the quickest way to value a business is if given a share price for a company and then its **market capitalisation** can be calculated as **share price × no of shares** (often overlooked by students making them look rather foolish!).

The following illustration will be used throughout this section to demonstrate the above valuation techniques. A typical exam question may require you to do a valuation of a company or demonstrate a detailed understanding of the benefits and drawbacks of all of the valuation techniques.

LECTURE EXAMPLE 6.1

AJB is an IT consultancy based in Asia that trades globally. It was established 10 years ago. The four founding shareholders own 25% of the issued share capital each and are also executive directors of the entity. The shareholders are considering a flotation of AJB on an Asian stock exchange and have started discussing the process and a value for the entity with financial advisors. The four founding shareholders, and many of the entity's employees, are technical experts in their field; however they are not financial experts.

Assume you are one of AJB's financial advisors. You have been asked to estimate a value for the entity and explain your calculations and approach to the directors. You have obtained the following information.

Summary financial data for the past three years and forecast revenue and costs for the next two years is as follows.

Statement of profit or loss for the years ended 31 December

	Actual			Forecast	
	20X1	**20X2**	**20X3**	**20X4**	**20X5**
	$m	**$m**	**$m**	**$m**	**$m**
Revenue	85.0	92.5	102.0	115.0	130.0
Less:					
Cash costs	29.8	32.4	35.7	40.3	45.5
Depreciation	22.5	35.0	35.0	35.0	35.0
Pre-tax profits	32.7	25.1	31.3	39.7	49.5
Tax	9.8	7.5	9.4	11.9	14.9
PAT	22.9	17.6	21.9	27.8	34.6
Dividends	10.0	10.6	11.2	11.9	12.6
Retained profits	12.9	7.0	10.7	15.9	22.0

Statement of financial position at 31 December

	20X1	**20X2**	**20X3**
	$m	**$m**	**$m**
ASSETS			
Non-current assets			
Property & Equipment	100	115	125
Current assets	35	40	45
	135	155	170
EQUITY & LIABILITIES			
Share capital (50c shares)	20	20	20
Retained profits	95	102	113
	115	122	133
Current liabilities	20	33	37
	135	155	170

Note*:* The book valuations of non-current assets are considered to reflect current realisable values.

Other information/assumptions

Growth in after tax cash flows for 20X6 and beyond (assume indefinitely) is expected to be 2% per annum.

Cash operating costs can be assumed to remain at the same percentage of revenue as in previous years.

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Depreciation can be assumed to equal capital allowances and to remain constant from 20X6 onwards at the 20X5 level. Capital expenditure can be assumed to equal depreciation.

Tax has been payable at 30% per annum for the last three years. This rate is expected to continue for the foreseeable future and tax will be payable in the year in which the liability arises.

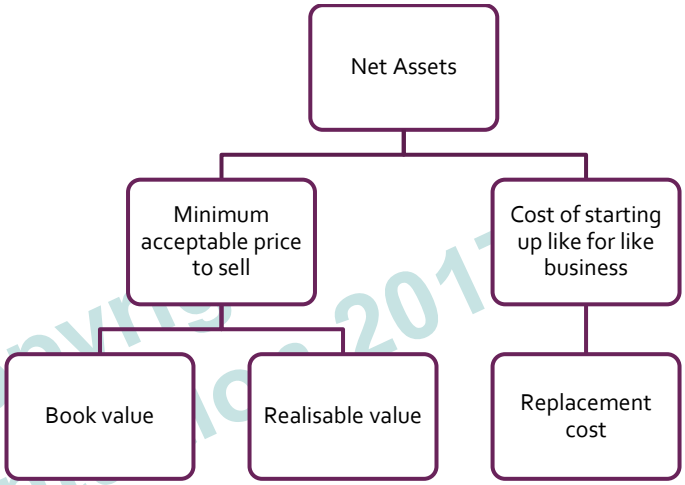
A comparable company to AJB which is already listed has a current share price of $7.50 based on earnings per share of $0.50 for the year ended 31st December 20X3.

An estimated cost of equity capital for the industry is 11% after tax.

Required:

Calculate a range of values for AJB, in total and per share, using methods of valuation that you consider appropriate.

2.2 Asset based valuations



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To get an estimate of the minimum potential valuation, the net asset value as it appears on the statement of financial position can be a quick and easy starting point. Care needs to be taken to identify the correct net assets figure (strictly this is **non-current assets plus net current assets less any long-term liabilities**).

Important points to note:

- Statement of financial position **book values** are likely to be stated at **historic cost** and therefore not representative of current market values (important if there is a large property/land element that has not been revalued).
- A **realisable value** would give a better indication of price if there was a sell off or asset stripping intention. However, realisable values would need to be given in the question and would generally be lower than market values since the reason for sale would probably be known (e.g. football clubs in financial trouble selling off key players for less than their true worth).
- Using the **replacement cost** of the assets may be more appropriate if you are trying to duplicate an existing business. You would need to be given the replacement cost of the assets in the question.

LECTURE EXAMPLE 6.1 (a)

Calculate the asset based valuation for AJB and briefly comment on your answer.

Advantages and disadvantages

Advantages	Disadvantages
Quick and simple to estimate.	Not as good at valuing the on-going earnings/profit potential of the business.
Gives a starting point/benchmark.	Does not consider valuation of assets not shown on the statement of financial position such as intangible assets.

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2.3 Income based valuations

These methods are useful if valuing an on-going earnings stream with a view to the business carrying on. For example, if considering an acquisition where a controlling stake in being considered (since the acquirer will be in control of the potential earnings).

2.3.1 P/E valuation

Per Chapter 1, the PE ratio of a company = $\frac{\text{Share price}}{\text{Earnings per share}}$

A P/E ratio gives an indication of the market's perception of the future growth potential of a business. By applying a suitable P/E ratio to the current earnings the valuation of a business can be estimated as:

- $Market\ value\ of\ all\ ordinary\ shares = \frac{P}{E} ratio\ \times current\ earnings\ (PAT\ usually)$

Or if trying to value an individual share:

- $Share\ price = \frac{P}{E} ratio\ \times EPS$

Important points to note:

The P/E ratio used should reflect as closely as possible the potential growth of the business in the question. **This may require a P/E ratio of a similar business to be used and then adjusted to reflect any differences in likely growth** (e.g. expected growth, strength of team, quoted or unquoted status, R&D capability…).

The earnings figure used should be the sustainable earnings available to the ordinary shareholders, typically this is the **profit after tax (PAT)** but some adjustments may be necessary if the current earnings figure is distorted by any one-off factors (e.g. restructuring costs, salaries).

P/E ratios are only available for quoted (listed) companies so if valuing an unquoted (non-listed) business a P/E ratio for a similar quoted business must be used (& adjusted if necessary).

LECTURE EXAMPLE 6.1 (b)

Calculate a valuation on a P/E basis for AJB and briefly comment on your answer.

SOLUTION

Advantages and disadvantages

Advantages	Disadvantages
Quick to calculate. Considers future potential. Useful for valuing unquoted companies.	Adjustments may be necessary to both the P/E and earnings figure. Which P/E to use in a takeover situation (target co's, predator co's or an average)?

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2.3.2 Earnings yield

This is a much less common method of valuing a business but should give essentially the same valuation as the P/E method.

The Earnings Yield ratio is calculated as $\frac{Earnings}{MV\ of\ shares}$ or $\frac{EPS}{Share\ price}$ (i.e. the inverse of the P/E ratio).

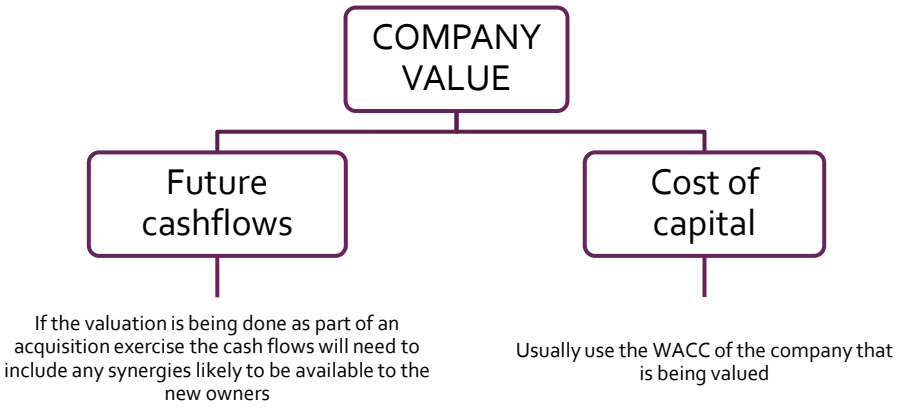
This can then be used to value a company (often by using a listed company's earnings yield:

- $MV\ of\ all\ shares = \frac{Earnings\ (PAT)}{Earnings\ yield}$
- $Share\ price = \frac{EPS}{Earnings\ yield}$

2.4 Cash flow based valuations

Cash based methods are also useful for valuing the on-going business, with DCF appropriate for controlling interests and dividend based methods more suitable for smaller (i.e. minority) shareholdings since they are only valuing the entitlement to a future stream of dividends.

2.4.1 Discounted cash flow



Sundry points to note:

- The calculation approach is the same as for typical DCF project appraisal (see Chapter 4)
- Strictly speaking, if you want to find the MV of the shares in a business you should take the **cash flows attributable to the shareholders (after interest and tax)** and discount using a shareholders required return **(the cost of equity, K_e)**.
- If **cash flows (before interest but after tax)** are discounted at the **WACC** the result will give the total value (debt + equity) of the business, so to get the value of the shares only you need to **deduct the market value of any debt**.

Cashflows	Cashflow after interest and tax	Cashflow before interest, but after tax
Discount rate to use	Cost of equity	WACC
Result	MV of equity	MV of equity + MV of debt

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LECTURE EXAMPLE 6.1 (C)

Calculate the discounted cash flow valuation of AJB and briefly comment on your answer.

SOLUTION

Advantages and disadvantages

Advantages	Disadvantages
Considers future potential. Can be used to value any business.	Future cash flows will be estimates only. Requires a cost of capital to be estimated.
	Determining the time horizon for future cashflows is problematic. If constant growth is assumed after a point, then a large part of the valuation will be based on a very simplified estimate.

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2.4.2 Dividend yield

As discussed in Chapter 1, the dividend yield of a company = $\frac{\text{Dividend per share}}{\text{Share Price}}$

This can be used to value a company:

- $MV\ of\ all\ shares = \frac{Dividends}{dividend\ yield}$
- $Share\ price = \frac{dividend\ per\ share}{dividend\ yield}$

Important points to note:

- Dividend yields are only available for quoted companies, so if valuing a non-listed company you will have to use the dividend yield of a similar listed company and make some adjustments to your valuation (similar idea to P/E adjustments in the P/E valuation in that for a non-listed company the valuation needs to be scaled down potentially).

2.4.3 Dividend growth model

We have already seen the dividend growth model used to estimate a company's cost of equity.

A rearranged version of that formula can be used to estimate the value of the equity in the business (providing a figure for k_e can be identified).

This views the cash flows that the shareholder actually might receive rather than the overall cash flows the company generates and as such it is better suited to valuing minority shareholdings.

FORMULA GIVEN IN EXAM

$$P_o = \frac{D_o(1+g)}{(r_e - g)}$$

P_o = Current ex-div share price
D_o = Current dividend
r_e = Return on equity or the cost of equity
g = Constant growth in dividends

Important points to note:

- The toughest challenge is to identify a relevant cost of equity figure (k_e). The normal rule would be to try to use the cost of equity for the business you are trying to value. If this is not available then you may need to use a cost of equity of a similar business and make any necessary adjustments to reflect differences in their capital structure (gearing).
- The formula assumes dividends are going to grow at a **constant** rate **forever**.
- As per Chapter 5, growth can be estimated either by using historic figures, or the earnings retention method.

LECTURE 6.1 (d)

Calculate a dividend valuation for AJB and briefly comment on your answer.

SOLUTION

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Advantages and disadvantages

Advantages	Disadvantages
Considers future cash flows to shareholder. Relevant for minority interests.	Assumes dividends grow at a constant rate forever. Requires a cost of equity to be estimated. Spurious results arise for businesses that don't pay dividends (zero value) or where **growth (g) > cost of equity (k_e)** (negative value).

3 The valuation of debt and other financial assets

When valuing the debt in a company we will use essentially the same approaches as in Chapter 5, although this time we will be given the cost of debt and will be asked to find the market value of debt.

Note: Because we will not know the tax position of the owners of the debt, we will be using a pre-tax cost of debt to value pre-tax cashflow when calculating the market values.

3.1 Irredeemable debt

The valuation of **irredeemable debt** can be calculated by using the following formula:

$$P_o = \frac{I}{r_d}$$

Where:

P_o = Current ex-interest debt value
I = Interest
r_d = Required return of the debt holders

ILLUSTRATION 6.1

Hammered Co has some $100 nominal value 6% irredeemable debt. Hammered's debt holders have a required return of 7%.

What is the value of Hammered Co debt?

SOLUTION

I = $6
r_d = 0.07

So $P_o = \frac{6}{0.07} = \$86$

So the value of Hammered Co debt is $86.

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3.2 Redeemable debt

The valuation of **redeemable debt** capital can be calculated by discounting the future cash flows that will be received by the redeemable debt holders (interest and the redemption value) at their required rate of return (r_d).

ILLUSTRATION 6.2

Plastered Co has some $100 nominal value 4% redeemable debt. This debt will be redeemed in seven years' time at a 12% premium. The debt holders' required return is 10%. What is the value of Plastered Co redeemable debt?

SOLUTION

I = $4
R_v = $112
r_d = 10%

Timing	Cash flow	Discount Factor	Present Value
	$	10%	$
1 – 7	4	4.868	19.47
7	112	0.513	57.46
			76.93

So the value of Plastered Co redeemable debt is $76.93.

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3.3 Convertible debt

Convertible debt is similar to redeemable debt however at the end of the debts life it can either be redeemed or converted into a certain number of ordinary shares. This is the debt holder's decision and will depend upon the value of the shares compared to the redemption value.

ILLUSTRATION 6.3

Sozzled Co has some $100 nominal value 6% convertible debt. This debt will be redeemed in four years' time at par or converted into 20 ordinary shares. A financial expert has forecast that Sozzled's shares, which are currently valued at $3.48, will be worth $5.10 in four years' time. The convertible debt holders required return is 10%. What is the market value of Sozzled Co convertible debt?

SOLUTION

So in four years' time the debt can either be redeemed for $100 or converted into shares which will be worth 20 × $5.10 = $102 and so the debt will be converted.

I = $6
R_v = $102
r_d = 10%

Timing	Cash flow	Discount Factor	Present Value
	$	10%	$
1 – 4	6	3.170	19.02
4	102	0.683	69.67
			$88.69

So the value of Sozzled Co convertible debt is $88.69.

Rather than calculating the market value, we could calculate the floor value which assumes that the debt will not be converted but redeemed.

ILLUSTRATION 6.3 CONTINUED (PART 2)

What is the floor value of Sozzled Co convertible debt?

SOLUTION

Timing	Cash flow	Discount Factor	Present Value
	$	10%	$
1 – 4	6	3.170	19.02
4	100	0.683	68.30
			$87.32

So the floor value of Sozzled Co convertible debt is $87.32.

Finally we can also calculate the conversion premium, which is the difference between the current market value of the convertible debt and the current conversion value of the shares. This is the extra value in holding the convertible debt rather than the equivalent shares.

ILLUSTRATION 6.3 CONTINUED (PART 3)

What is the conversion premium of Sozzled Co convertible debt?

SOLUTION

The current conversion value is 20 × $3.48 = $69.60.

So the conversion premium of Sozzled Co convertible debt is $88.69 – $69.60 = $19.09 or $19.09/20 = $0.95 per share.

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3.4 Preference shares

Preference shares are similar to ordinary shares except the dividend is constant and so there is no growth. Thus the value of **preference share** capital can be calculated by using the following formula:

$$P_o = \frac{D_o}{K_p}$$

ILLUSTRATION 6.4

Razzled Co has just paid a dividend of 20 cents on its preference shares. The preference shareholders required return is 11%. What is the value of Razzled Co preference share capital?

SOLUTION

D_o = $0.20
K_p = 0.11

So $P_o = \frac{0.20}{0.11}$

So $P_o = \$1.82$

So the value of Razzled Co preference share capital is $1.82.

4 Efficient Market Hypothesis (EMH) and practical considerations in the valuation of shares

4.1 Market Efficiency

An efficient market is one where:

- No individual dominates the market
- Transaction costs are not significant
- Share prices change 'quickly' to reflect information about a company

There are different degrees of efficiency which reflect different interpretations of the word 'quickly':

4.1.1 Weak form efficiency

- Share prices reflect all information available from past changes in the price i.e. all past information which has now become a fact (e.g. past share price movements, results from audited sets of accounts).
- Hence, the market cannot be beaten by technical analysis (the study of past share price movements), as share prices already reflect the information that technical analysis uses to predict share prices.

4.1.2 Semi-strong form efficiency

- Share prices reflect all information available from past changes in the price and any publicly available current information i.e. all past and present publicly available information.
- Hence, the market cannot be beaten by reading the news or published accounts, as all publically available information is already reflected in share prices.
- Major stock markets are close to semi-strong efficiency. This is tested by monitoring the speed with which markets react to new publically available information.

4.1.3 Strong form efficiency

- Share prices reflect all information available from past changes in the price and any publicly available current information and any inside information i.e. all information.
- Hence the market cannot be beaten, even using insider information.

4.2 Practical considerations in the valuation of shares and businesses

4.2.1 Marketability and liquidity of shares

The main difference between private and listed company shares is that listed company shares are far more marketable and hence the shares are more liquid. This feature makes listed company shares more valuable.

4.2.2 Availability and sources of information

The more information that is available and the more reliable and independent the source of that information, the less risk there will be. Reducing the risks increases the value.

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4.2.3 Market imperfections and pricing anomalies

Markets are not perfect and as a result the actual value put on a business will not necessarily equal its theoretical value. Markets are often higher at particular times in the day, particular days of the week and particular times of the year. 'Speculation bubbles' are also rarely based on rational thinking.

4.2.4 Market capitalisation

Market capitalisation is the total market value of a company's ordinary shares or the size of a company. The larger a company, the more stable its overall earnings tend to be and so the lower risk it is seen to have and consequently, the lower the long-term return. This will enhance its value in bad times but reduce it in good times.

4.3 Behavioural Finance

Behavioural finance proposes psychology-based theories to explain stock market anomalies. Within behavioural finance, it is assumed that the information structure and the characteristics of market participants systematically influence individuals' investment decisions as well as market outcomes.

Behavioural finance uses the psychological factors behind investor decisions such as sentiment and speculation to explain why irrational investor behaviour is likely to have a significant impact on share prices.

Examples of these factors include:

- Investor over-confidence
- Cognitive dissonance (clinging onto long-held beliefs and ignoring evidence to the contrary)
- Availability bias (placing too much significance on the latest piece of available information and losing sight of the bigger picture).

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7

Risk management

1 Managing interest rate risk

1.1 Causes of interest rate risk

Interest rate risk refers to the sensitivity of a company's profits and cashflows to changes in interest rates.

For example, a company with variable rate debt will face increases in interest payments if interest rates rise.

1.1.1 Gap risk / exposure

Gap exposure arises where the principle of matching the maturity of funding to maturity of assets (discussed in Chapter 3) has not been followed.

- For example, a company may have initially secured an interest rate on 5-year borrowing and used this borrowing to fund the purchase of a 10-year income generating asset (we can assume that the income from the asset exceeded the interest rate on the borrowing at the start).
- When the debt matures after 5 years, the company will have to refinance and will be exposed to any increases in interest rates over the course of the 5-year period – i.e. the 'spot' rate (current interest rate) in 5 years' time may be higher than today.
- This may mean that interest rate secured on the funding for the second 5-year period may exceed the income from the asset.

In other words there is a gap between the earnings and the required interest payments. The earnings and interest rate risks can vary over time and so the gap exposure will not necessarily be constant.

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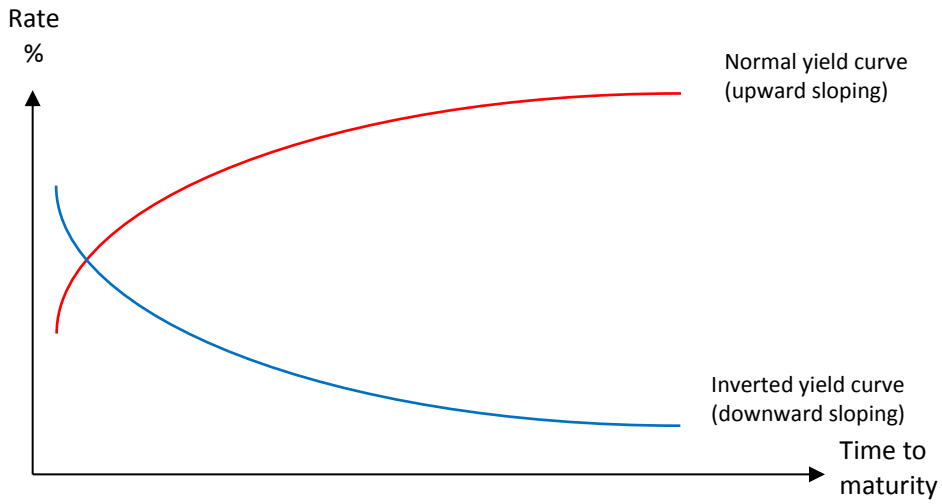
1.2 Structure of interest rates and yield curves

The yield curve shows the relationship between the interest rates (yields) on debt instruments (traded in the money markets and bond markets) and their maturities.

There are several theories that attempt to explain the relationship between interest rates and the time to maturity:



1.2.1 Liquidity preference theory

- Liquidity preference theory states that as investors prefer instant access to their funds, the longer the funds are borrowed for, the higher the cost will be.
- This would result in the normal yield curve shown above.

1.2.2 Expectations theory

- Expectations theory states that the shape of the yield curve reflects investors' expectations of future interest rates.
- Hence, if lenders expected interest rates to fall in the future, then they would be prepared to accept lower interest rates on borrowing spanning future periods. This would result in short term interest rates being higher than long term interest rates, resulting in the inverted yield curve shown above.

1.2.3 Market segmentation

- Market segmentation explains that the yield curve may not in fact be a perfect curve as is it is made up of different segments of investors, some investing for the short term, some the medium term and some the long term.
- Hence the shape of the yield curve would be based on the supply of money to lend and the demand to borrow at each maturity date, leading to 'humps' at maturity dates where there is greater demand to borrow.

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1.3 Techniques for hedging interest rate risk

1.3.1 Basic / traditional methods of interest rate risk management

Matching

This is where a company has investments and loans of the same value earning and paying the same rate of interest at the same dates. Thus if interest rates change the effects self-cancel. This technique is most commonly used by financial institutions and for the majority of institutions is a noble long-term goal that is practically very difficult to achieve.

Smoothing

This is where a company maintains a balance between fixed rate and variable rate borrowing to reduce the impact of any interest rate rises.

Asset and liability management

This involves matching the term of assets and liabilities (i.e. the matching approach from Chapter 3), in order to avoid gap exposure.

Forward rate agreements (FRAs)

FRAs are contracts that help companies to fix the rate of interest to pay on borrowing that will start at a future date:

- **Borrowers** wanting to fix an interest rate on some future borrowing will need to **buy a FRA**
- A borrower buying a FRA will pay the FRA fixed rate and receive the spot (benchmark) rate in one net settlement at the start of the borrowing period.
- FRAs settle on the start date of the underlying loan as one net payment or receipt (but no amounts are actually lent as part of the FRA).
- The net impact (across the FRA and the actual borrowing) is that the borrower will pay the FRA fixed rate.

Terminology:

- A spot interest rate of 5.65-5.61 means that you can borrow at 5.65% and deposit at 5.61% (remember, you always get the worst rate!).
- A 3-6 FRA starts in 3 months' time and lasts for 3 months
- A FRA fixed rate of 5.75-5.70 means you can fix a rate to borrow at 5.75%, and to deposit at 5.70%

Advantages of FRAs

- They fix an interest rate, hedging away any downside risk
- They are tailored to the investor (so they won't be under/over hedged)

Disadvantages of FRAs

- They are usually only available on loans > £500k & < 1yr maturity
- They remove any upside potential (i.e. if interest rates were to fall)
- They cannot be cancelled (e.g. if the borrowing requirement changes)

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ILLUSTRATION 7.1

In 3 months' time Paton Co will be borrowing $2.5m for 3 months from a bank and wants to hedge uncertainty over its borrowing costs using a forward rate agreement. The quote for a 3-6 forward rate agreement is currently 2.60-1.35.

Show the effect if in 3 months' time the spot rate of interest is 3%.

Answer:

- As our borrowing period will start in 3 months' time and last for 3 months, we will need to buy a 3-6 FRA with notional value $2.5m
- In 3 months' time we will pay the FRA fixed rate (2.6%) and receive the spot rate
- The cashflow on the FRA = (3% - 2.6%) × $2.5m × 3/12 = $2,500 receipt
- We will then borrow $2.5m at spot and pay interest = $2.5m × 3% × 3/12 = $18,750
- Net payment = $18,750 - $2,500 = $16,250
- Hence, the effective interest rate = ($16,250/$2,500,000) × 12/3 = 2.6% (= the FRA rate)

1.3.2 Hedging interest rate risk with derivatives

A derivative is something which derives its value from something else; in this context it will be interest rates. There are three main types of interest rate derivative:

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Interest Rate Futures

These are similar to forward rate agreements, but futures are of a standardised contract size, standardised maturity date and are traded on organised exchanges.

- Settlements take place in three-monthly cycles ending in March, June, September and December.
- **Borrowers will sell futures now** and buy the same number of futures contracts when their borrowing starts. This will lead to a net cash payment or receipt based on the difference between the price sold at and the price purchased at.
- However, the futures do not facilitate the borrowing – we will still have to borrow at spot.
- Being traded on an exchange means that they can be closed out i.e. by purchasing an equal and opposite investment in the same underlying currency, prior to maturity. This makes futures more flexible than forward contracts.
- The futures price will change as the spot price changes and this allows any gain or loss on the actual borrowing (due to interest rate movements) to be offset by losses/ gains on the futures.

Advantages of futures

- They fix an interest rate, hedging away any downside risk
- They may be closed out early (and are hence more flexible than FRAs)

Disadvantages of futures

- They are standardised and hence may lead to over / under hedging (if maturity dates and contract sizes don't fit with borrowing requirements)
- They remove any upside potential (i.e. if interest rates were to fall)
- Futures prices will differ to the spot rate until you reach the maturity date of the future and this will lead to the hedge not being 100% effective if the borrowing date doesn't equal the futures maturity date (this is known as **'basis risk'**)

Options

Over the counter (OTC) interest rate options can be purchased from major banks and allow the borrower to have the right, but not the obligation to borrow at a set fixed rate (strike price) in the future.

- The borrower would have to pay a premium now to buy the option contract and would then wait to see how interest rates move before deciding whether to exercise the option or not.
- If interest rate rise between now and the borrowing date, the borrower would exercise the option and borrow at the pre-determined fixed rate specified in the option
- If interest rates fall between now and the borrowing date, the borrower would let the option lapse and borrow at the spot rate.

Advantage of options

- They only hedge away the downside risk, leaving the borrower the ability to benefit from the upside (rates falling) – this is in contrast to FRAs and futures.

Disadvantage of options

- They are expensive and the premium must be paid up front.

Swaps

Interest rate swaps involve two counterparties swapping interest rate payments on a set notional borrowing amount for a set period of time.

The swap would be based on one party having fixed rate debt, but actually desiring variable rate interest payments and another party wanting fixed rate interest payments but having variable rate debt.

By swapping interest payments, the two parties get the type of interest rate exposure that they desire, without having to renegotiate the terms of their debt / refinance.

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2 Managing foreign exchange risk

2.1 Different types of foreign currency risk

2.1.1 Transaction risk

- Transaction risk refers to the risk a business is exposed to when it enters into a short term transaction involving credit in a non-native currency - e.g. a UK based exporter making a sale on 1-month credit with payment in Euros.
- By the time the transaction is actually settled the exchange rate may have moved adversely (e.g. Euros weakening against the Pound) and the value of the receipt will have reduced.

2.1.2 Economic risk

- Economic risk refers to the longer term risk a business is exposed to by trading in a particular foreign country – e.g. a UK exporter (whose costs are in Pounds) making sales to the US
- If the Dollar weakens vs. the Pound, then the value of Dollar denominated sales to the US will reduce, but costs in Pounds will not, leading to the exporter becoming less competitive than US rivals (whose costs and revenues are both denominated in Dollars).

2.1.3 Translation risk

- Translation risk refers to the danger of a business generating accounting losses when translating the results of overseas subsidiaries (denominated in a foreign currency) into their group reporting currency
- E.g. a UK parent company may generate paper losses when translating accumulated Dollar profits from a US subsidiary into Pounds if the Dollar weakens against the Pound.

2.2 Causes of exchange rate fluctuations

2.2.1 Balance of payments

The **balance of payments** is the difference between a country's overseas earnings and spending. If a country earns more than it spends it will have a surplus and if it spends more than it earns it will have a deficit.

A surplus implies the country is doing well and so its exchange rate will strengthen and a deficit implies it is doing badly and so the exchange rate will weaken.

2.2.2 Interest rate parity theory (IRPT)

Interest rate parity theory states that the difference between the current spot exchange rate (S_0) and current forward rate (F_0) reflects the difference between nominal interest rates in each country.

- This needs to hold for there to be no arbitrage (risk-free profits) available
- I.e. an investor should be indifferent between buying Dollars using a forward contract OR borrowing Pounds to buy Dollars at spot and investing Dollars in a deposit account.

  Assumptions: spot price represents equilibrium price (demand = supply)

FORMULA GIVEN IN EXAM

$$F_0 = S_0 \times \frac{(1 + i_c)}{(1 + i_b)}$$

Where:

F_0 = Current forward exchange rate
S_0 = Current spot exchange rate
i_c = interest rate in foreign country
i_b = interest rate in home country

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ILLUSTRATION 7.2

The current exchange rate between the USA and the UK is $1.9854:£1. Interest rates in the USA are forecast to be 8% for the next year and UK interest rates are forecast to be 6%.

What should the current one year forward rate be (using interest rate parity)?

SOLUTION

S_0 = 1.9854
i_c = 0.08
i_b = 0.06

So the forward rate for the first year is: $F_0 = 1.9854 \times \frac{(1+0.08)}{(1+0.06)}$

$F_0 = 2.0229$

2.2.3 Purchasing power parity theory (PPPT)

Purchasing power parity theory states that the difference between the current spot rate (S_0) and expected future spot rate (S_1) is equal to the difference between inflation rates in each country

- I.e. an investor should be indifferent between buying goods in Pounds OR converting money to Dollars and buying the same goods in Dollars
- If it is cheaper to buy goods in the US (due to higher inflation in the UK), the exchange rate will adjust to make Dollars more expensive as more people buy Dollars - bringing the equivalent future Pound and Dollar prices back in line.
- I.e. the country with higher inflation will see its currency weaken (depreciate).

  Problems: inflation rates are estimates; PPPT works better in the long run as it is hampered by government intervention (monetary policy).

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FORMULA GIVEN IN EXAM

$$S_1 = S_0 \times \frac{(1 + h_c)}{(1 + h_b)}$$

Where:

S_1 = Expected future spot rate
S_0 = Current spot exchange rate
h_c = inflation rate in foreign country
h_b = inflation rate in home country

LECTURE EXAMPLE 7.1

The current exchange rate between the USA and the UK is $1.9854:£1. Inflation in the USA is forecast to be 5% for the next year and UK inflation is forecast to be 3%.

What is the forecast exchange rate in one year's time using purchasing power parity?

SOLUTION

2.2.4 Four-way equivalence

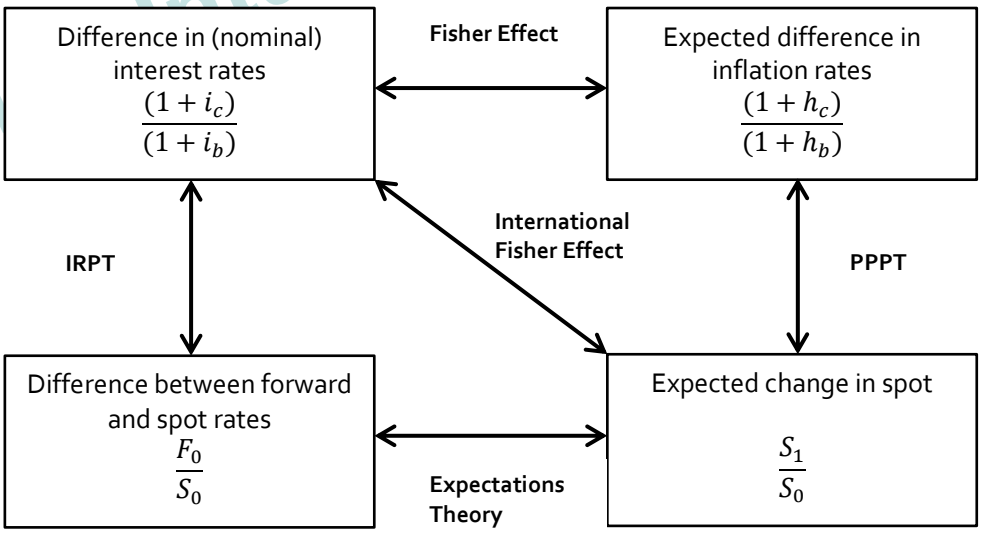
International Fisher Effect

- Assuming that real interest rates are the same in both countries, the only difference between the nominal rates in the two countries is caused by differences in the inflation rates in the two countries (per the Fisher effect in Chapter 4).
- Hence nominal interest rate differences should be an unbiased predictor of future changes in the spot rate

Expectations theory

- Following on, the current forward rate should therefore be an unbiased predictor of the future spot rate

These theories are summarised in the diagram below:



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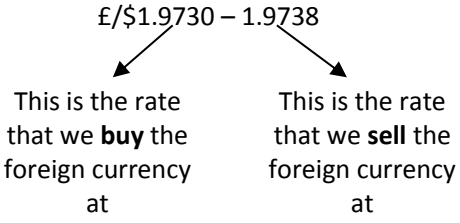
2.3 Quotation conventions for foreign exchange rates

In the real world exchange rates are quoted as a spread e.g. Spot rate ($ per £): 1.9854 ± 0.0003 or 1.9851 to 1.9857.

The correct rate to select depends upon whether you are translating a cost or revenue figure. Remember the bank always wins and so if it is a cost you use the rate that gives the highest domestic currency figure and if it is revenue you use the rate that gives the lowest domestic currency figure.

The spread is normally presented in the form:

Spot rate £/$1.9730 – 1.9738



2.4 Hedging techniques for foreign currency risk

2.4.1 Basic / traditional methods of foreign currency risk management

Currency of invoice

By ensuring that the **currency of invoice** is the same as the domestic currency, the transaction risk is removed entirely in a cheap and effective way. The risk is in fact transferred to the other party involved in the transaction and so this will not always be a **viable solution**.

Netting and matching

Netting and matching can be used where foreign currency is both being earned and spent so that receipts and payments can be netted (just leaving the risk on the net balance). This approach is facilitated by having a bank account denoted in relevant currency.

However this only works where there is a two way flow in the currency concerned and so unless the organisation is both earning and spending the currency in question, this approach will not be available.

Leading and lagging

Leading: e.g. bringing forward a foreign currency payment if you think that the foreign currency will strengthen before the payment due date

- Remember that if you lead on a payment, then you will incur borrowing costs in making the payment early!

Lagging: e.g. trying to push back a foreign currency payment if you think that the foreign currency will weaken after the current expected payment date

- This is not strictly hedging, rather speculation – if you lag on a payment then you remain exposed to FX movements.

Asset and liability management

Asset and liability management involves matching the assets and liabilities held in a particular currency. In this way any change in value is automatically off set between the asset and liability. This technique also eliminates the translation risk.

However, in practice, it will not always be economical to raise funds in the same currency as they are to be invested.

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Forward exchange contracts

A **forward exchange contract** is a contract, normally with a bank, which fixes the exchange rate that will be used on the future transaction today, thus the transaction risk is being taken, for a fee, by the bank (the fee is usually factored into the rate offered).

These share the same advantages (a tailor made hedge) and disadvantages (hedges upside and downside risk, can't be cancelled or exited early) as FRAs. Not being cancellable is problematic if the future receipt / payment date changes (delivery will still be expected).

LECTURE EXAMPLE 7.2

Exportit Co is a UK based organisation which sells some goods on three months' credit to a US customer for $90,000. The current exchange rate is $1.9851-$1.9857:£1 and the bank has offered Exportit a forward contract at a rate of $2.0117-$2.0123.

Using a forward contract, how much sterling will Exportit receive in three months' time?

SOLUTION

Calculating a forward rate

- Instead of being given the forward rate, you may be asked to calculate it. For example, you may be given the spot rate spread and the necessary adjustments to the spot rate to calculate the forward rate.
- The forward rate adjustment is quoted as a **premium** or **discount** on the spot rate.
- If the forward rate is at a discount, it means the foreign currency is expected to depreciate in relation to the home currency. Thus the home currency will be worth more under the forward rate than it is currently.
- It may seem illogical but therefore you need to ADD a discount, but DEDUCT a premium as the exchange rate tells us what the home currency is worth.

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ILLUSTRATION 7.3

Spot rate £/$1.9730 – 1.9738 (i.e. £1 = 1.973 dollars). The 2 month forward adjustment is given as 0.9 to 0.58 cents premium for £/$.

To calculate the 2 month forward rate spread :

	£/$	**Spread**
Spot (£/$)	1.9730 – 1.9738	0.0008
2 month adjt (premium)	0.0090 – 0.0058	
2 month forward rate	1.9640 – 1.9680	0.0040

Three things to note here:

(1) A "premium" will ALWAYS mean that you DEDUCT the adjustment

(2) The forward adjustment is usually quoted in the smallest unit of currency, so 0.9 cents = $0.0090

(3) The spread for a forward contract is ALWAYS greater than the spread for the spot

LECTURE EXAMPLE 7.3

Spot rate £/$ 1.9730 – 1.9738

The 3 month forward adjustment is given as 0.06 to 0.14 cents discount for £/$.

Calculate the 3-month forward rate spread.

SOLUTION

Money market hedging

Money market hedging involves borrowing or lending money in the money markets to match the overseas transaction and eliminate the transaction risk by fixing an effective forward exchange rate.

- So if a company is expecting an overseas receipt, it borrows money now such that at termination the receipt and borrowing match and cancel each other out.
- The borrowings can then be translated into the home currency at the current known exchange rate and then invested to create a certain home currency receipt in the future.
- If a company is expecting to make an overseas payment, then the reverse process is followed (borrowing now in the home currency and depositing in the foreign currency).

MM hedges are effectively do-it-yourself forward contracts, however the interest rates obtained by companies in the money markets are unlikely to be as good as those obtained by banks and so these are not that widely used (and may prove more difficult to arrange and expensive than forward contracts).

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MM Hedge step-by-step guide:

To hedge future payment in Euros:	To hedge future receipt in Euros:
Borrow in $ now	Borrow in € now
Convert to € at spot	Convert to $ at spot
Deposit €, earn interest	Deposit $, earn interest
On payment date, settle payment out of € deposit account	On receipt date, use receipt to pay back € loan
Pay back $ loan + interest.	Withdraw $ from deposit

LECTURE EXAMPLE 7.4: MM HEDGE – FOREIGN CURRENCY PAYMENT

Importit Co is a UK based organisation which buys some goods on three months credit from a US supplier for $90,000. The current exchange rate is $1.9851-$1.9857:£1 and the money market interest rates are as follows:

	Borrowing	Depositing
One year sterling interest rate:	6.0%	5.7%
One year dollar interest rate:	8.3%	8.0%

Using a money market hedge, how much sterling will Importit pay in three months' time?

SOLUTION

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LECTURE EXAMPLE 7.5: MM HEDGE – FOREIGN CURRENCY RECEIPT

Trading Co is a UK based organisation which sells some goods on six months credit to a European customer for €120,000. The current exchange rate is €1.1446-€1.1452:£1 and the money market interest rates are as follows:

	Borrowing	Depositing
One year sterling interest rate:	6.0%	5.7%
One year euro interest rate:	4.0%	3.7%

Using a money market hedge, how much sterling will Trading receive in six months' time?

SOLUTION

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2.4.2 Hedging foreign exchange risk with derivatives

A derivative is something which derives its value from something else; in this context it will be foreign exchange rates. There are three main types of FX derivative:

FX Futures

These are similar to forward contracts, but FX futures are of a standardised contract size, standardised maturity date and are traded on organised exchanges.

- Settlements take place in three-monthly cycles ending in March, June, September and December.
- E.g. a US company expecting to receive Euros in 3 months' time will sell Euro futures now (to lock in a Dollar price at which they can sell the Euros).
- They will then buy the same number of Euro futures contracts when on the date they receive the Euros.
- This will lead to a net cash payment or receipt in Dollars based on the difference between the price sold at and the price purchased at.
- However, the futures do not facilitate the sale of the Euros – we will still have to sell our Euros at the spot rate to a buyer.
- Being traded on an exchange means that they can be closed out i.e. by purchasing an equal and opposite investment in the same underlying currency, prior to maturity. This makes futures more flexible than forward contracts.
- The futures price will change as the spot price changes and this allows any gain or loss on the actual business transaction to be offset by losses or gains on the futures.

Advantages of futures

- They fix an exchange rate, hedging away any downside risk
- They may be closed out early (and are hence more flexible than forwards)

Disadvantages of futures

- They are standardised and hence may lead to over / under hedging (if maturity dates and contract sizes don't fit with the user's requirements)
- They remove any upside potential (i.e. in the above example if the Euro strengthens vs the Dollar)
- Futures prices will differ to the spot rate until you reach the maturity date of the future and this will lead to the hedge not being 100% effective if the transaction date doesn't equal the futures maturity date (this is known as **'basis risk'**)

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FX Options

Over the counter (OTC) currency options can be purchased from major banks and allow the user to have the right, but not the obligation to e.g. sell Euros at a set Dollar price (strike price) in the future (this would be a 'put' option – the right to sell, 'call' options are the right to buy).

- We would have to pay a premium now to buy the option contract and would then wait to see how exchange rates move before deciding whether to exercise the option or not.
- If Euros weaken vs. the Dollar between now and the receipt date, we would exercise the option and sell the Euros at the pre-determined fixed Dollar price specified in the option
- If Euros strengthen vs. the Dollar between now and the receipt date, we would would let the option lapse and sell the Euros at the spot rate.

Advantage of options

- They only hedge away the downside risk, leaving the borrower the ability to benefit from the upside (rates falling) – this is in contrast to forwards and futures.

Disadvantage of options

- They are expensive and the premium must be paid upfront.

Currency Swaps

Currency swaps involve two counterparties swapping principal and interest rate payments on borrowings in two different currencies.

- For example, a US based company might have arranged existing debt finance in Dollars but are using the debt to finance an investment in operations in the Eurozone.
- Meanwhile, a French company has existing debt in Euros which it is using to finance operations in the US.
- A currency swap would allow the two parties to swap interest payments and notionals on their debt to better facilitate asset and liability management (see earlier), without the pain of having to refinance (especially useful if either of the two companies are unable to borrow in their desired currency).

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Solutions to Class lecture examples

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Chapter 1

Lecture example 1.1

ROCE	$\frac{2,159}{7,340 + 3,562 - 3,070} \times 100 =$	28%
Return on Equity	$\frac{1,260}{4,956} \times 100 =$	25%
EPS	$\frac{1,260}{2,100} =$	$0.60
Dividend per share	$\frac{525}{2,100} =$	$0.25
P/E ratio	$\frac{7.20}{0.60} =$	12
TSR	$\frac{0.25 + (7.20 - 7)}{7} =$	6.4%

These figures give us very little indication as to whether or not Diamond Co is achieving its own corporate objectives, however if we knew what its corporate objectives were and what ROCE, Return on Equity, EPS and Dividend per Share had been achieved in previous years, we would then be better placed to reach a conclusion.

However we are able to compare these figures with the industry averages, though care needs to be taken:

(1) ROCE: Diamond is marginally outperforming the industry average.

(2) Return on Equity: The fact that this slightly lower than the industry average, but the ROCE is higher, suggests that the debt holders are doing relatively well.

(3) EPS: The industry average comparison is almost certainly meaningless as this figure depends upon the nominal value of the shares and this can be any figure the company chooses. If Diamond had twice as many shares with half their current nominal value, the total nominal value of the shares would be the same, but the EPS would be halved to \$0.30.

(4) Dividend per share: Again comparing with the industry average is dangerous as the significance of the absolute dividend depends upon what was paid for the shares and the risks being faced by shareholders.

(5) Total shareholder return: to conclude on whether this is a sufficient return for shareholders we would need to compare it to either an industry average or an estimated cost of equity for Diamond Co (see chapter 5).

Chapter 2

No lecture examples

Chapter 3

Lecture example 3.1

Current ratio	$\frac{936 + 2{,}626}{1{,}296 + 537 + 1{,}237} =$	1.2
Quick ratio	$\frac{2{,}626}{1{,}296 + 537 + 1{,}237} =$	0.9
Inventory turnover ratio	$\frac{14{,}687 - 4{,}386}{936} =$	11 times
Average collection period	$\frac{2{,}626}{14{,}687} \times 365 =$	65 days
Average payable period	$\frac{1{,}296}{14{,}687 - 4{,}386} \times 365 =$	46 days
Sales revenue/net working capital ratio	$\frac{14{,}687}{492} =$	29.9

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Lecture example 3.2

C_o = \$20
D = 500 units × 12months = 6,000 units per annum
C_h = \$1.20 @ 20% = \$0.24

$$\text{EOQ} = \sqrt{\frac{2 \times 20 \times 6{,}000}{0.24}} = 1{,}000 \text{ units}$$

$$\text{TAC} = \left(20 \times \frac{6{,}000}{1{,}000}\right) + \left(0.24 \times \frac{1{,}000}{2}\right) = \$120 + \$120 = \$240$$

By ordering 1,000 units of inventory whenever Paton places an order, the total annual variable inventory costs are minimised at \$240.

Lecture example 3.2 revisited

The total annual cost of ordering at the EOQ including the purchase price is:

$$\left(20 \times \frac{6{,}000}{1{,}000}\right) + \left(0.24 \times \frac{1{,}000}{2}\right) + (6{,}000 \times 1.20) = \$120 + \$120 + \$7{,}200 = \$7{,}440$$

The total annual cost of ordering 1,500 units including the purchase price is:

$$\left(20 \times \frac{6{,}000}{1{,}500}\right) + \left(0.24 \times 0.995 \times \frac{1{,}500}{2}\right) + (6{,}000 \times 1.20 \times 0.995) = \$80 + \$179 + \$7{,}164 = \$7{,}423$$

Thus it is financially worth Paton Co taking advantage of the bulk discount.

Lecture example 3.3

The cost of this scheme is the discount:

$4,450,000 × 80% × 5% = $178,000

The benefits of this scheme are:

Reduction in bad debts (8% – 5%) × $4,450,000 =			$133,500
Reduction in overdraft interest:			
Old receivables $4,450,000 × 55/365 =		$670,548	
New receivables $4,450,000 × 30/365 =		$365,753	
Reduction in receivables		$304,795	
Interest saved	× 12% =		$36,575
Total benefit			$170,075

So as the costs are greater than the benefits this particular scheme is not economically worthwhile.

Lecture example 3.4

	June	July	August
	$	$	$
Receipts			
From customers (W1)	13,365	54,576	100,845
Capital	50,000		
	63,365	54,576	100,845
Payments			
Materials (W3)		12,000	19,125
Labour (W4)	16,000	25,500	32,000
Variable overheads (W5)	2,000	5,188	7,187
Fixed overheads (W6)	15,000	15,000	15,000
	33,000	57,688	73,312
Net cash flow	30,365	(3,112)	27,533
Opening balance	0	30,365	27,253
Closing balance	$30,365	$27,253	$54,786

Workings

(W1) Cash receipts from customers

	June	July	August
Sales	$45,000	$108,000	$135,000
Received in month of sale (30% × 99% × sales in mth)	$13,365	$32,076	$40,095
Received 1 mth later (50% × previous mth sales)	–	$22,500	$54,000
Received 2 mths later (15% × sales 2 mths ago)	–	–	$6,750
TOTAL	$13,365	$54,576	$100,845

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(W2) Production

In order to work out our costs we need to establish the production volumes each month. This can be done by taking the sales volumes for a month, adding closing inventory and deducting opening inventory.

	June	July	August	September
Sales volume	500	1,200	1,500	1,900
Add: closing inventory (25% of next month's sales)	300	375	475	
Less: opening inventory	nil	300	375	
Production	800	1,275	1,600	

Now we know this we can calculate the cash flows for the variable costs:

(W3) Materials

	June	July	August
Production (W2)	800	1,275	
Material cost (@ $15 each)	$12,000	$19,125	
Cash payment (1 month later)	nil	$12,000	$19,125

(W4) Labour

	June	July	August
Production (W2)	800	1,275	1,600
Labour cost (@ $20 each)	$16,000	$25,500	$32,000
Cash payment (same month)	$16,000	$25,500	$32,000

(W5) Variable overheads

	June	July	August
Production (W2)	800	1,275	1,600
Variable overhead cost (@ $5 each)	$4,000	$6,375	$8,000
Cash payment (50% same month)	$2,000	$3,188	$4,000
Cash payment (50% month later)	nil	$2,000	$3,187
TOTAL	$2,000	$5,188	$7,187

(W6) Fixed overheads

Monthly cost = $180,000 ÷ 12 months = $15,000

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Lecture example 3.5

Spread = $3\left(\frac{3/4 \times 575 \times 400{,}000{,}000}{0.0003}\right)^{1/3} = \$249{,}466$

Return point = $-40{,}000 + (⅓ \times 249{,}466) = \$43{,}155$

Upper limit = $-40{,}000 + 249{,}466 = \$209{,}466$

Chapter 4

Lecture example 4.1

Materials:	The relevant cost is \$0.80 × 1,200kg = \$960, which is the benefit forgone from the next best alternative use of the material.
Labour:	The relevant cost is nil as there is no incremental cost.
Overheads:	The relevant cost is \$34,564. The fixed overhead will not change and so is not incremental.
Machine:	The original purchase price of \$20,000 is not relevant as this is a sunk cost. Ignoring the new opportunity, Proposal Co would keep the machine as it will earn more money (\$15,000) than its scrap value (\$12,000). If the machine is used on the new project, the final question to ask is, will Proposal Co replace it? The answer is yes as the replacement cost (\$14,000) is less than the money it will earn (\$15,000). So the relevant cost is \$14,000.

Lecture example 4.2

	Annual cash flow	Cumulative cash flow
	\$	\$
Investment	(80,000)	(80,000)
First year	15,000	(65,000)
Second year	20,000	(45,000)
Third year	25,000	(20,000)
Fourth year	30,000	10,000

So the payback period is 4 years or if we assume that the cash flows come in evenly throughout each year:

$3 + \frac{20,000}{30,000} = 3\frac{2}{3}$ years

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Lecture example 4.2 (part 2)

Average profit = $\frac{((\$15,000 + \$20,000 + \$25,000 + \$30,000 + \$35,000) - \$80,000)}{5} = \$9,000$

ROCE = $\frac{\$9,000}{\$40,000} \times 100 = 22.5\%$

Lecture example 4.3

FV = \$16,751
r = 0.05
n = 6

So PV = $16,751 \times (1 + 0.05)^{-6}$ = \$12,500

Lecture example 4.4

A = \$150
r = 0.06
n = 12

So PV = $\$150 \times \frac{1-(1+0.06)^{-12}}{0.06} = \$1,258$

Lecture example 4.3 revisited

FV = $16,751
r = 0.05
n = 6

So PV = 16,751 × 0.746 = $12,496

Lecture example 4.4 revisited

A = $150
r = 0.06
n = 12

So PV = $150 × 8.384 = $1,258

Lecture example 4.5

A = $150
r = 0.06
n = 12

So value as at t3 (one year before the cashflows start) = $150 × 8.384 = $1,258

PV = $1,258 x DF (3 years, 6%) = $1,258 x 0.84 = $1,057

Lecture example 4.6

A = $2,000
r = 0.05

So PV = $2{,}000 \times \frac{1}{0.05} = \$40{,}000$

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Lecture example 4.2 (part 3)

Timing	Cash flow	Discount Factor		Present Value
	$	10%		$
0	(80,000)	1.000		(80,000)
1	15,000	0.909		13,635
2	20,000	0.826		16,520
3	25,000	0.751		18,775
4	30,000	0.683		20,490
5	35,000	0.621		21,735
			NPV =	$11,155

Lecture example 4.2 (part 4)

Timing	Cash flow	Discount Factor	Present Value	Discount Factor	Present Value
	$	10%	$	20%	$
0	(80,000)	1.000	(80,000)	1.000	(80,000)
1	15,000	0.909	13,635	0.833	12,495
2	20,000	0.826	16,520	0.694	13,880
3	25,000	0.751	18,775	0.579	14,475
4	30,000	0.683	20,490	0.482	14,460
5	35,000	0.621	21,735	0.402	14,070
			$11,155		$(10,620)

$$\text{IRR} \approx 0.10 + \frac{11{,}155}{11{,}155-(10{,}620)} \times (0.20 - 0.10)$$

$$= 0.15 \text{ or } 15\%$$

Lecture example 4.7

The net present value of the proposed investment:

Time	0	1	2	3	4
	$000	$000	$000	$000	$000
Sales (no. of games × selling price)		3,750	1,680	1,380	1,320
Direct materials ($5.40 × no of games × $(1+h)^n$)		(834)	(401)	(354)	(365)
Variable production costs ($6.00 × no of games × $(1+h)^n$)		(927)	(446)	(393)	(405)
Advertising		(650)	(100)	–	–
Lost contribution on existing game (10,000 × $15)		(150)	(150)	(150)	(150)
Net operating cash flow		1,189	583	483	400
Tax @ 30%		(357)	(175)	(145)	(120)
New machine	(800)				150
Tax saved on Capital Allowances (W1)		48	48	48	51
Working capital (W2)	(375)	207	30	6	132
Net cash flow	(1,175)	1,087	486	392	613
Discount Factor @ 15%	1.000	0.870	0.756	0.658	0.572
Present Value	(1,175)	946	367	258	351
Net Present Value			$747		

As the net present value is positive, the proposed investment should be accepted as it will increase the shareholders' wealth by $747k.

(W1) Tax saved on Capital Allowances

Time			Tax	Tax Saved Cash Flow
		$000		$000
0	Purchase	800		
1	CA @ 20%	(160)	@30%	48
		640		
2	CA @ 20%	(160)	@30%	48
		480		
3	CA @ 20%	(160)	@30%	48
		320		
4	Sale Proceeds	(150)		
		170		
	Balancing Allowance	(170)	@30%	51
		Nil		195

(W2) Working capital

Time	0	1	2	3	4
	$000	$000	$000	$000	$000
Sales (no. of games × selling price)		3,750	1,680	1,380	1,320
Working capital needed (10% × sales)	375	168	138	132	0
Working capital cash flows	(375)	207	30	6	132

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Illustration 4.2 (part 2)

If the present value falls by more than $6,831, the NPV will no longer be positive.

If the sales volume falls then so will the direct costs and the tax. So, a $1 fall in revenue will cause the net operating cash flow to fall by $1 × (1 – 0.35) = $0.65 and the net cash flow after tax to fall by $0.65 × (1 – 0.30) = $0.455 or 45.5%. So the present value impact of the revenue is:

Timing	Revenue cash flow	Direct costs and tax reduction	Net cash flow after tax	Discount Factor		Present Value
	$	45.5%	$	9%		$
1	27,000	0.455	12,285	0.917		11,265
2	37,000	0.455	16,835	0.842		14,175
3	49,000	0.455	22,295	0.772		17,212
					PV =	42,652

$$\frac{\$6,831}{\$42,652} \times 100 = 16\%$$

A rise in overheads will also cause the tax to fall. So the present value impact of the overheads is:

Timing	Overhead cash flow	Tax reduction	Net cash flow after tax	Discount Factor	Present Value
	$	70%	$	9%	$
1 – 3	9,000	0.70	6,300	2.531	15,945

$$\frac{\$6,831}{\$15,945} \times 100 = 42.8\%$$

For the NPV of the project to hit zero, the cost of capital would have to increase to equal the internal rate of return (the actual % return on the project). For instance, the NPV at 20% =

Time	0	1	2	3
	$	$	$	$
Net cash flow	(40,000)	8,985	12,785	36,045
Discount Factor @ 20%	1.000	0.833	0.694	0.579
Present Value	(40,000)	7,485	8,873	20,870

NPV = $(2,772)

$$\text{IRR} \approx 0.09 + \frac{6,831}{6,831-(2,772)} \times (0.20 - 0.09)$$

$$= 16.8\%$$

$$\frac{16.8\%-9\%}{9\%} \times 100 = 87\%$$

Thus the new machine is most sensitive to the revenue estimate.

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Lecture example 4.8

(a)

Time	0	1	2	3
	$	$	$	$
Expected revenue (W1)		480,000	515,000	510,000
Direct costs @ 60%		(288,000)	(309,000)	(306,000)
Overheads		(54,000)	(54,000)	(54,000)
Net operating cash flows		138,000	152,000	150,000
Tax @ 35%		(48,300)	(53,200)	(52,500)
Equipment (W2)	(300,000)			130,000
Net cash flow	(300,000)	89,700	98,800	227,500
Discount Factor @ 13%	1.000	0.885	0.783	0.693
Present Value	(300,000)	79,385	77,360	157,657

Expected NPV = $14,402

Workings 1: Expected Sales Values

Second Year	Probability	Forecast Sales	
High	0.55	$650,000	$357,500
Low	0.45	$350,000	$157,500
		Expected Sales Value =	$515,000

Third Year	Probability	Forecast Sales	
High	0.25	$600,000	$150,000
Medium	0.60	$500,000	$300,000
Low	0.15	$400,000	$60,000
		Expected Sales Value =	$510,000

Workings 2: Expected Disposal Value

	Probability	Forecast Sales	
High	0.4	$160,000	$64,000
Low	0.6	$110,000	$66,000
		Expected Disposal Value =	$130,000

(b) For the revenue to exceed $1,600,000, as the first year's sales are $480,00, the second year's sales would need to be high ($650,000) and the third year's sales would need to be either high or medium ($600,000 or $500,000). So the probability of this is:

$(0.55 \times 0.25) + (0.55 \times 0.60) = 0.1375 + 0.33 = 0.4675$

Lecture example 4.2 (part 5)

Time	Cash flow	Discount factor	Present value	Cumulative cash flow
	$	10%	$	$
0	(80,000)	1.000	(80,000)	(80,000)
1	15,000	0.909	13,635	(66,365)
2	20,000	0.826	16,520	(49,845)
3	25,000	0.751	18,775	(31,070)
4	30,000	0.683	20,490	(10,580)
5	35,000	0.621	21,735	11,155

So the adjusted payback period is 5 years.

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Lecture example 4.9

Replace every year:

Time	Cash flow	12% DF	PV	Annuity factor	EAC
0	(7,000)	1.000	(7,000)		
1	(3,000)	0.893	(2,679)		
1	5,000	0.893	4,465		
			(5,214)	0.893	(5,839)

Replace every 2 years:

Time	Cash flow	12% DF	PV	Annuity factor	EAC
0	(7,000)	1.000	(7,000)		
1	(3,000)	0.893	(2,679)		
2	(4,000)	0.797	(3,188)		
2	3,500	0.797	2,790		
			(10,077)	1.690	(5,962)

Replace every 3 years:

Time	Cash flow	12% DF	PV	Annuity factor	EAC
0	(7,000)	1.000	(7,000)		
1	(3,000)	0.893	(2,679)		
2	(4,000)	0.797	(3,188)		
3	(4,750)	0.712	(3,382)		
3	2,500	0.712	1,780		
			(14,469)	2.402	(6,024)

So Mobile Co should replace their grinding machines every year.

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Chapter 5

Lecture example 5.1

(a) White Spirit Co needs to raise enough funds for the new investment opportunity and the issue costs: \$4,288,000 + \$212,000 = \$4,500,000

Rights issue price \$2.40 × 75% = \$ 1.80

So the number of shares that will need to be issued is \$4,500,000/\$1.80 = 2.5m shares. As the company already has 10m shares, this will be a 1 for 4 rights issue.

The current value of Spirit's shares = \$2.40 x 10m = \$24m

Hence the TERP = $\frac{\$24m+\$4.5m-\$212k}{10m+2.5m}$ = \$2.26

(b) The value of one right = TERP – issue price = \$2.26 - \$1.80 = \$0.46

(c) Before the rights issuance, White Spirit has:

- PAT = \$2m
- Market value of equity = 10m x £2.40 = \$24m
- Hence, it's P/E ratio = \$24m / \$2m = 12

After the rights issuance, White Spirit has:

- PAT = \$2m x 1.15 = \$2.3m
- Market value of equity = \$2.3m x 12 = \$27.6m

Hence the new share price = $27.6m / 12.5m shares = $2.21

This is lower than the TERP of $2.26, hence the proposed use of the funds is unacceptable for the shareholders (as it will lead to them making a loss).

Lecture example 5.2

D_o = $0.25
g = 0.09
P_o = $3.75

So $r_e = \frac{0.25(1+0.09)}{3.75} + 0.09$

r_e = 0.16 or 16%

Lecture example 5.3

R_f = 0.05
β_i = 1.5
$E(r_m)$ = 0.17

So $E(r_i)$ = 0.05 + 1.5(0.17 – 0.05) = 0.23

So the cost of equity for Drewboy Co is 23%.

Lecture example 5.4

I = $6
T = 0.30
P_o = $84

So $K_d = \frac{6(1-0.30)}{84} = 0.05$

So the cost of debt for Hammered Co is 5%.

Lecture example 5.5

I = $4
T = 0.35
P_o = $75

R_v = $112

Timing	Cash flow	Discount Factor	Present Value	Discount Factor	Present Value
	$	10%	$	5%	$
0	(75)	1.000	(75)	1.000	(75)
1 – 7	4(1 – 0.35)	4.868	12.66	5.786	15.04
7	112	0.513	57.46	0.711	79.63
			$(4.88)		$19.67

IRR $\approx 0.05 + \frac{19.67}{19.67-(4.88)} \times (0.10 - 0.05)$

$= 0.09$

So the cost of redeemable debt for Plastered Co is 9%.

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Lecture example 5.6

D_o = \$0.20
P_o = \$1.90

So $K_p = \frac{0.20}{1.90}$

So the cost of preference share capital for Razzled Co is 11%.

Lecture example 5.7

I = 8
T = 0.25
P_o = 100

So $K_b = \frac{8(1-0.25)}{100}$

$K_b = 0.06$

So the cost of bank debt capital for Blotto Co is 6%.

Lecture example 5.8

D_o = \$0.45
g = 0.06
P_o = \$5.25

So $r_e = \frac{0.45(1+0.06)}{5.25} + 0.06$

$r_e = 0.15$

I = \$7
T = 0.35
P_o = \$83 – \$7 = \$76

So $K_d = \frac{7(1-0.35)}{76} = 0.06$

So the WACC using book values is:

$$\text{WACC} = \left(\frac{19{,}450{,}000}{19{,}450{,}000+10{,}000{,}000}\right)0.15 + \left(\frac{10{,}000{,}000}{19{,}450{,}000+10{,}000{,}000}\right)0.06$$

$$= 0.12 \text{ or } 12\%$$

To calculate the WACC using market values we first need to calculate the total market value of the equity and debt:

Total market value of equity = 4,500,000 shares @ \$5.25 = \$23,625,000

Total market value of debt = \$10,000,000 @ 76% = \$7,600,000

So the WACC using market values is:

$$\text{WACC} = \left(\frac{23{,}625{,}000}{23{,}625{,}000+7{,}600{,}000}\right)0.15 + \left(\frac{7{,}600{,}000}{23{,}625{,}000+7{,}600{,}000}\right)0.06$$

$$= 0.13 \text{ or } 13\%$$

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Lecture example 5.9

Fletch Co is in the correct business, but has the wrong gearing level. So we will need to ungear Fletch Co's beta, taking out 32% gearing and then add in Millie Mo's 43% gearing.

$$\beta_a = \frac{68}{68+32(1-0.30)} \times 1.36$$

$$\beta_a = 1.02$$

$$1.02 = \frac{57}{57+43(1-0.30)} \times \beta_e$$

$$1.02 = 0.654 \times \beta_e$$

$$\beta_e = \frac{1.02}{0.654} = 1.56$$

$$R_f = 0.04$$
$$E(r_m) = 0.18$$

So the project specific discount rate for Millie Mo's new project is 25.8%.

Chapter 6

Lecture example 6.1

(a) Calculate the asset based valuation for AJB

The most recent net asset value from the statement of financial position is **$133m**. This could be expressed as a value per share of $133m/40m shares = **$3.325**. The limitations of this value here are that:

No account is taken of any intangible value which in an IT consultancy might be assumed to be a significant amount (see later valuation of intangibles/intellectual property).

Whilst we are told that book values reflect realisable values there is no indication as to when things like the non-current assets were last revalued.

(b) Earnings based valuation for AJB

The P/E ratio for the similar listed company = $7.5/$0.5 = 15

Applying a P/E valuation to the most recent (i.e. 2013) earnings (PAT) gives:

15 x $21.9m = $328.5m = MV_e

Hence, the value of one share = $328.5m / 40m = $8.21

However, adjustments would have to be made for differences between the two companies:

- AJB is not listed, hence it might have a lower P/E ratio (due to investors paying a premium for shares in a listed company due to increased liquidity / marketability → hence we may need to revise the valuation down (say by 25-30%?)
- What are the growth projections in each company?
- How does the gearing of each company compare?

All of these differences could cause the P/E valuation to be inaccurate.

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(c) Cash flow valuation of AJB

The free cash flow can be estimated as follows for the future cash flows starting in one year's time

	1	2	3	Thereafter
PAT	27.8	34.6		
Add: depreciation	35.0	35.0		
Less: CAPEX	35.0	35.0		
Free cash flow	**27.8**	**34.6**	**35.3**	Growing at 2%pa

A PV calculation can then be performed on the future cash flows.

Step 1 – Work out the value as at 2015 of the growing perpetuity from 2016 onwards:

$$Value\ at\ 20X5 = 20X6\ cashflow \times \frac{1}{r-g} = 35.3 \times \frac{1}{0.11-0.02} = \$\mathbf{392}\boldsymbol{m}$$

Step 2 – The PV of all future cash flows can now be calculated:

Time	Cash flow	11% DF	PV
	$m		$'m
1	27.8	0.901	25.0
2	34.6	0.812	28.1
3	392.0	0.812	318.3
Valuation			371.4

or a value per share of **$9.29**

But, how realistic is constant growth after X5 and a constant cost of equity?

(d) Dividend valuation for AJB

Using historic growth to predict future growth:

$\$10m \times (1+g)^2$ = $11.2m

Hence,

$$\sqrt{\frac{\$11.2m}{\$10m}} - 1 = g = 5.8\%$$

Using the DGM formula;

$$P_0 = \frac{d_1}{K_e - g} = \frac{\$11.9m}{0.11-0.058} = \$\mathbf{228.8}\boldsymbol{m}\ (or\ \$5.72\ per\ share)$$

Remember to question the assumptions about constant growth and a constant cost of equity

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Chapter 7

Lecture example 7.1

S_0 = 1.9854
h_c = 0.05
h_b = 0.03

S1 = $1.9854 \times \frac{(1+0.05)}{(1+0.03)}$

S1 = 2.0240

Lecture example 7.2

By taking out a forward contract with its bank, Exportit knows that the exchange rate on this transaction is fixed at $2.0123:£1. So in three months' time Exportit will receive:

$\frac{\$90,000}{\$2.0123} = £44,725$

Lecture example 7.3

	£/$	Spread
Spot (£/$)	1.9730 – 1.9738	0.0008
3 month adjt (discount)	0.0006 – 0.0014	
3 month forward rate	1.9736 – 1.9752	0.0016

(1) A "discount" will ALWAYS mean that you ADD the adjustment (Remember ADDIS)
(2) The spread for a forward contract is again greater than the spread for the spot

Lecture example 7.4

To match the $90,000 payment in three months' time, Importit will need to invest $\frac{\$90,000}{1+(0.08 / 4)}$ = $88,235 today.

To make this investment it will need to borrow $\frac{\$88,235}{\$1.9851}$ = £44,449 today.

So in three months' time Importit will owe £44,449 × {1 + (0.06/4)} = £45,116.

Lecture example 7.5

To match the €120,000 receipt in six months' time, Trading will need to borrow $\frac{\$120,000}{1+(0.04 / 2)}$ = €117,647 today.

This loan can be translated into $\frac{€117,647}{€1.1452}$ = £102,731 today.

So in six months' time Trading will receive £102,731 × {1 + (0.057/2)} = £105,658.

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Formulae sheets

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Formulae Sheet

Economic order quantity

$$= \sqrt{\frac{2C_0D}{C_h}}$$

Miller–Orr Model

$$\text{Return point} = \text{Lower limit} + \left(\frac{1}{3} \times \text{spread}\right)$$

$$\text{Spread} = 3\left[\frac{\frac{3}{4} \times \text{transaction cost} \times \text{variance of cash flows}}{\text{interest rate}}\right]^{\frac{1}{3}}$$

The Capital Asset Pricing Model

$$E(r_i) = R_f + \beta_i\left(E(r_m) - R_f\right)$$

The asset beta formula

$$\beta_a = \left[\frac{V_e}{\left(V_e + V_d(1-T)\right)}\beta_e\right] + \left[\frac{V_d(1-T)}{\left(V_e + V_d(1-T)\right)}\beta_d\right]$$

The Growth Model

$$P_o = \frac{D_0(1+g)}{(r_e - g)}$$

Gordon's growth approximation

$$g = br_e$$

The weighted average cost of capital

$$WACC = \left[\frac{V_e}{V_e + V_d}\right]k_e + \left[\frac{V_d}{V_e + V_d}\right]k_d(1-T)$$

The Fisher formula

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

Purchasing power parity and interest rate parity

$$S_1 = S_0 \times \frac{(1+h_c)}{(1+h_b)} \qquad F_0 = S_0 \times \frac{(1+i_c)}{(1+i_b)}$$

Co
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Present Value Table

Present value of 1 i.e. $(1 + r)^{-n}$

Where r = discount rate
n = number of periods until payment

Discount rate (r)

Periods (n)	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	
1	0·990	0·980	0·971	0·962	0·952	0·943	0·935	0·926	0·917	0·909	1
2	0·980	0·961	0·943	0·925	0·907	0·890	0·873	0·857	0·842	0·826	2
3	0·971	0·942	0·915	0·889	0·864	0·840	0·816	0·794	0·772	0·751	3
4	0·961	0·924	0·888	0·855	0·823	0·792	0·763	0·735	0·708	0·683	4
5	0·951	0·906	0·863	0·822	0·784	0·747	0·713	0·681	0·650	0·621	5
6	0·942	0·888	0·837	0·790	0·746	0·705	0·666	0·630	0·596	0·564	6
7	0·933	0·871	0·813	0·760	0·711	0·665	0·623	0·583	0·547	0·513	7
8	0·923	0·853	0·789	0·731	0·677	0·627	0·582	0·540	0·502	0·467	8
9	0·914	0·837	0·766	0·703	0·645	0·592	0·544	0·500	0·460	0·424	9
10	0·905	0·820	0·744	0·676	0·614	0·558	0·508	0·463	0·422	0·386	10
11	0·896	0·804	0·722	0·650	0·585	0·527	0·475	0·429	0·388	0·350	11
12	0·887	0·788	0·701	0·625	0·557	0·497	0·444	0·397	0·356	0·319	12
13	0·879	0·773	0·681	0·601	0·530	0·469	0·415	0·368	0·326	0·290	13
14	0·870	0·758	0·661	0·577	0·505	0·442	0·388	0·340	0·299	0·263	14
15	0·861	0·743	0·642	0·555	0·481	0·417	0·362	0·315	0·275	0·239	15

(n)	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%	
1	0·901	0·893	0·885	0·877	0·870	0·862	0·855	0·847	0·840	0·833	1
2	0·812	0·797	0·783	0·769	0·756	0·743	0·731	0·718	0·706	0·694	2
3	0·731	0·712	0·693	0·675	0·658	0·641	0·624	0·609	0·593	0·579	3
4	0·659	0·636	0·613	0·592	0·572	0·552	0·534	0·516	0·499	0·482	4
5	0·593	0·567	0·543	0·519	0·497	0·476	0·456	0·437	0·419	0·402	5
6	0·535	0·507	0·480	0·456	0·432	0·410	0·390	0·370	0·352	0·335	6
7	0·482	0·452	0·425	0·400	0·376	0·354	0·333	0·314	0·296	0·279	7
8	0·434	0·404	0·376	0·351	0·327	0·305	0·285	0·266	0·249	0·233	8
9	0·391	0·361	0·333	0·308	0·284	0·263	0·243	0·225	0·209	0·194	9
10	0·352	0·322	0·295	0·270	0·247	0·227	0·208	0·191	0·176	0·162	10
11	0·317	0·287	0·261	0·237	0·215	0·195	0·178	0·162	0·148	0·135	11
12	0·286	0·257	0·231	0·208	0·187	0·168	0·152	0·137	0·124	0·112	12
13	0·258	0·229	0·204	0·182	0·163	0·145	0·130	0·116	0·104	0·093	13
14	0·232	0·205	0·181	0·160	0·141	0·125	0·111	0·099	0·088	0·078	14
15	0·209	0·183	0·160	0·140	0·123	0·108	0·095	0·084	0·074	0·065	15

Annuity Table

Present value of an annuity of 1 i.e. $\frac{1-(1+r)^{-n}}{r}$

Where r = discount rate
n = number of periods

Discount rate (r)

Periods (n)	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	
1	0·990	0·980	0·971	0·962	0·952	0·943	0·935	0·926	0·917	0·909	1
2	1·970	1·942	1·913	1·886	1·859	1·833	1·808	1·783	1·759	1·736	2
3	2·941	2·884	2·829	2·775	2·723	2·673	2·624	2·577	2·531	2·487	3
4	3·902	3·808	3·717	3·630	3·546	3·465	3·387	3·312	3·240	3·170	4
5	4·853	4·713	4·580	4·452	4·329	4·212	4·100	3·993	3·890	3·791	5
6	5·795	5·601	5·417	5·242	5·076	4·917	4·767	4·623	4·486	4·355	6
7	6·728	6·472	6·230	6·002	5·786	5·582	5·389	5·206	5·033	4·868	7
8	7·652	7·325	7·020	6·733	6·463	6·210	5·971	5·747	5·535	5·335	8
9	8·566	8·162	7·786	7·435	7·108	6·802	6·515	6·247	5·995	5·759	9
10	9·471	8·983	8·530	8·111	7·722	7·360	7·024	6·710	6·418	6·145	10
11	10·368	9·787	9·253	8·760	8·306	7·887	7·499	7·139	6·805	6·495	11
12	11·255	10·575	9·954	9·385	8·863	8·384	7·943	7·536	7·161	6·814	12
13	12·134	11·348	10·635	9·986	9·394	8·853	8·358	7·904	7·487	7·103	13
14	13·004	12·106	11·296	10·563	9·899	9·295	8·745	8·244	7·786	7·367	14
15	13·865	12·849	11·938	11·118	10·380	9·712	9·108	8·559	8·061	7·606	15

(n)	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%	
1	0·901	0·893	0·885	0·877	0·870	0·862	0·855	0·847	0·840	0·833	1
2	1·713	1·690	1·668	1·647	1·626	1·605	1·585	1·566	1·547	1·528	2
3	2·444	2·402	2·361	2·322	2·283	2·246	2·210	2·174	2·140	2·106	3
4	3·102	3·037	2·974	2·914	2·855	2·798	2·743	2·690	2·639	2·589	4
5	3·696	3·605	3·517	3·433	3·352	3·274	3·199	3·127	3·058	2·991	5
6	4·231	4·111	3·998	3·889	3·784	3·685	3·589	3·498	3·410	3·326	6
7	4·712	4·564	4·423	4·288	4·160	4·039	3·922	3·812	3·706	3·605	7
8	5·146	4·968	4·799	4·639	4·487	4·344	4·207	4·078	3·954	3·837	8
9	5·537	5·328	5·132	4·946	4·772	4·607	4·451	4·303	4·163	4·031	9
10	5·889	5·650	5·426	5·216	5·019	4·833	4·659	4·494	4·339	4·192	10
11	6·207	5·938	5·687	5·453	5·234	5·029	4·836	4·656	4·486	4·327	11
12	6·492	6·194	5·918	5·660	5·421	5·197	4·988	4·793	4·611	4·439	12
13	6·750	6·424	6·122	5·842	5·583	5·342	5·118	4·910	4·715	4·533	13
14	6·982	6·628	6·302	6·002	5·724	5·468	5·229	5·008	4·802	4·611	14
15	7·191	6·811	6·462	6·142	5·847	5·575	5·324	5·092	4·876	4·675	15

first intuition
where people count