

Paper F9

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PRACTICE QUESTIONS

1 Crystal Ltd

Crystal Ltd was established in 1999 to sell a range of computer software to small businesses. Since its incorporation, the business has grown rapidly and demand for its products continues to rise. The most recent financial accounts for the company are set out below:

Statement of Financial Position as at 31 May 2009

	\$	\$	\$
<i>Non-current assets</i>			
Freehold land and buildings at cost	55,000		
Less: Accumulated depreciation	<u>4,000</u>	51,000	
Equipment and fittings at cost	20,000		
Less: Accumulated depreciation	<u>5,000</u>	15,000	
Motor vehicles at cost	24,000		
Less: Accumulated depreciation	<u>6,000</u>	<u>18,000</u>	
			84,000
<i>Current assets</i>			
Inventories	26,000		
Receivables	<u>59,000</u>		
		85,000	
Less Liabilities: amounts falling due within one year			
Payables	88,000		
Proposed dividend	1,000		
Taxation	6,000		
Bank overdraft	<u>10,000</u>	<u>105,000</u>	<u>(20,000)</u>
			64,000
Less: liabilities amounts falling due beyond one year			
14% Bank loan (secured on freehold property)			<u>20,000</u>
			<u>44,000</u>
<i>Capital and reserves</i>			
Ordinary \$1 shares			25,000
Retained profit			<u>19,000</u>
			<u>44,000</u>



Income Statement for the year ended 31 May 2009

	\$	\$
Sales		660,000
Less: Cost of sales		
Opening inventory	22,000	
Purchases	426,000	
	<u>448,000</u>	
Less: Closing inventory	<u>26,000</u>	<u>422,000</u>
Gross profit		238,000
Less:		
Selling and distribution expenses	176,000	
Administration expenses	38,000	
Finance expenses	<u>7,000</u>	<u>221,000</u>
Net profit before taxation		17,000
Corporation tax		<u>6,000</u>
Net profit after taxation		11,000
Proposed dividend		<u>1,000</u>
Retained profit for the year		<u>10,000</u>

The company is family owned and controlled and, since incorporation, has operated without qualified finance staff. However, the managing director recently became concerned with the financial position of the company and therefore decided to appoint a qualified finance director to help manage the financial affairs of the business. Soon after joining the company, the finance director called a meeting of his fellow directors and at this meeting stated that, in his opinion, the company was overtrading.

Requirements

- (a) What do you understand by the term 'overtrading' and what are the possible consequences of this type of activity?
- (b) What are the main causes of overtrading and how might the management of a business overcome the problem of overtrading?
- (c) Calculate six financial ratios for Crystal Ltd which you believe would be useful in detecting whether the company was overtrading. Explain the significance of each ratio you calculate.



PRACTICE QUESTIONS

2 Diamond Ltd

Diamond Ltd provides office supplies and stationery for a wide range of small businesses. In recent months, the company has experienced liquidity problems and the managing director has decided that action must be taken to improve the situation. The principal shareholders of the company, however, have indicated that they are unable to provide further funding for the business and are unwilling to permit the issue of more loan capital. The accounts for the year ended 31 October 2010 are as follows:

Statement of Financial Position as at 31 October 2010

	\$	\$	\$
<i>Non-current Assets</i>			
Freehold land and buildings at cost		145,000	
Less: Accumulated depreciation		<u>28,000</u>	117,000
Fixtures and fittings at cost		45,000	
Less: Accumulated depreciation		<u>9,000</u>	36,000
Motor vehicles at cost		64,000	
Less: Accumulated depreciation		<u>22,000</u>	<u>42,000</u>
			195,000
<i>Current Assets</i>			
Inventories		52,000	
Receivables		<u>89,000</u>	
		141,000	
Less: liabilities: amounts falling due within one year			
Payables	64,000		
Proposed dividend	14,000		
Taxation	21,000		
Bank overdraft	<u>114,000</u>	<u>213,000</u>	<u>(72,000)</u>
			123,000
Less: liabilities: amounts falling due beyond one year			
12% Debentures (secured)			<u>40,000</u>
			<u>83,000</u>
<i>Capital and reserves</i>			
Ordinary \$1 shares			25,000
General reserve			10,000
Retained profit			<u>48,000</u>
			<u>83,000</u>

Income Statement for the year ended 31 October 2010

	\$	\$
Sales		835,000
Less: Cost of sales		
Opening inventory	36,000	
Purchases	<u>520,000</u>	
	556,000	
Less: Closing inventory	<u>52,000</u>	<u>504,000</u>
GROSS PROFIT		331,000
Less:		
Selling and distribution expenses	164,000	
Administration expenses	83,000	
Interest	<u>15,000</u>	<u>262,000</u>
Net profit before taxation		69,000
Corporation tax		<u>21,000</u>
Net profit after taxation		48,000
Proposed dividend		<u>14,000</u>
Retained profit for the year		<u>34,000</u>



PRACTICE QUESTIONS

All purchases and sales were on credit and the receivables and payables outstanding remained at a constant level throughout the year.

The managing director believes that the operating cash cycle should be as low as possible and wishes to improve the liquidity of the business by reducing the operating cash cycle of the business by at least 10 days. Given the views of the principal shareholders, the opportunities to raise long term funds are limited. Nevertheless, the managing director considers that a sale and lease back agreement concerning the freehold land is possible and that this would help overcome the company's weak liquidity position.

Requirements

Using the information above and any analysis you wish to make of it:

- (a) Explain why the managing director should be concerned with the short-term liquidity position of the company.
- (b) Calculate the existing cash operating cycle of the business.
- (c) State whether or not you agree with the managing director's view that the operating cycle should be as low as possible.
- (d) State the advantages and disadvantages of a sale and leaseback agreement to improve the liquidity of the company.

3 Sapphire

Sapphire Limited purchases 25,000 litres of a material each year from a single supplier. At the moment, the company obtains the material in batch sizes of 800 litres. The material costs \$16 per litre; the cost of ordering a new batch from the supplier is \$32 and the cost of holding one litre of inventory, due to certain technical difficulties, is \$4 per unit plus an interest cost equal to 15% of the purchase price of the material.

$$EOQ = \sqrt{\frac{2CD}{H}}$$

Requirements

- (a) Calculate the economic order quantity and the annual savings which would be obtained if this order quantity replaced the current order size of litres.
- (b) The supplier has agreed to offer a discount on orders above a certain size. He has offered the following price structure:

<i>Orders size (litres)</i>	<i>Unit cost (\$)</i>
0 – 499	16
500 – 999	15.20
1,000 plus	14.80

How does this affect the optimal order quantity, and what would be the annual savings compared to the inventory costs with the EOQ you calculated in (a)?



4 Ruby plc

Ruby plc sells stationery and office supplies on a wholesale basis and has an annual turnover of \$4,000,000. The company employs four people in its sales ledger and credit control department at an annual salary of \$12,000 each. All sales are on 40 days' credit with no discount for early payment. Irrecoverable debts represent 3% of turnover and Ruby plc pays annual interest of 9% on its overdraft. The most recent accounts of the company offer the following financial information:

Statement of Financial Position as at 31 December 2010

	\$'000	\$'000	\$'000
Non current assets			17,500
Current assets			
Inventory of goods for resale		900	
Receivables		550	
Cash		120	
		1,570	
Liabilities: amounts falling due within one year			
Payables	330		
Overdraft	1,200		
		1,530	
			40
			17,540
Liabilities: amounts falling due after more than one year			
12% Debenture due 2012			2,400
			15,140
Ordinary shares			3,500
Reserves			11,640
			15,140

Ruby plc is considering offering a discount of 1% to customers paying within 14 days, which it believes will reduce irrecoverable debts to 2.4% of turnover. The company also expects that offering a discount for early payment will reduce the average credit period taken by its customers to 26 days. The consequent reduction in the time spent chasing customers where payments are overdue will allow one member of the credit control team to take early retirement. Two-thirds of customers are expected to take advantage of the discount.

Required:

- (a) Using the information provided, determine whether a discount for early payment of 1 per cent will lead to an increase in profitability for Ruby plc.
- (b) Discuss the relative merits of short-term and long-term debt sources for the financing of working capital.
- (c) Discuss the different policies that may be adopted by a company towards the financing of working capital needs and indicate which policy has been adopted by Ruby plc.
- (d) Outline the advantages to a company of taking steps to improve its working capital management, giving examples of steps that might be taken.



5 Pearl plc

- (a) The Treasurer of Pearl plc is contemplating a change in financial policy. At present, Pearl's Statement of Financial Position shows that fixed assets are of equal magnitude to the amount of long-term debt and equity financing. It is proposed to take advantage of a recent fall in interest rates by replacing the long term debt capital with an overdraft. In addition, the Treasurer wants to speed up debtor collection by offering early payment discounts to customers and to slow down the rate of payment to creditors.

As his assistant, you are required to write a brief memorandum to other Board members explaining the rationales of the old and new policies and pin-pointing the factors to be considered in making such a switch of policy.

- (b) Emerald plc, which currently has negligible cash holdings, expects to have to make a series of cash payments (P) of \$1.5m over the forthcoming year. These will become due at a steady rate. It has two alternative ways of meeting this liability.

Firstly, it can make periodic sales from existing holdings of short-term securities. According to Emerald's financial advisers, the most likely average percentage rate of return (i) on these securities is 12% over the forthcoming year, although this estimate is highly uncertain. Whenever Emerald sells securities, it incurs a transaction fee (T) of \$25, and places the proceeds on short-term deposit at 5% per annum interest until needed. The following formula specifies the optimal amount of cash raised (Q) for each sale of securities:

$$Q = \sqrt{\frac{2 \times P \times T}{i}}$$

The second policy involves taking a secured loan for the full \$1.5m over one year at an interest rate of 14% based on the initial balance of the loan. The lender also imposes a flat arrangement fee of \$5,000, which could be met out of existing balances. The sum borrowed would be placed in a notice deposit at 9% and drawn down at no cost as and when required.

Emerald's Treasurer believes that cash balances will be run down at an even rate throughout the year.

Required:

Advise Emerald as to the most beneficial cash management policy.

Note: ignore tax and the time value of money in your answer.

- (c) **Discuss the limitations of the model of cash management used in part (b).**



6 Gold

- (a) Gold is considering a project requiring investment of \$100,000 in equipment with a life of five years and a residual value of \$15,000. Annual cash earnings will be \$25,000, \$34,000, \$25,000, \$15,000 and \$8,000 for the five years respectively.

Requirements

- (i) Calculate the ARR based on average investment,
- (ii) Calculate the ARR based on initial investment,
- (iii) Calculate the payback period.

- (b) Silver has a 25% cost of capital and is considering a project requiring initial investment of \$183,000. Annual savings will be \$70,000 for the next 4 years.

Requirements

- (i) Calculate the IRR of the project.
- (ii) Calculate the NPV of the project at 25%.

- (c) Bronze has recently expanded into new premises which cost \$2.5 million and have a current market value of \$2.6 million. Equipment must now be installed, one possibility being to purchase this for \$1 million, another being to transfer Bronze's existing equipment into the new premises at a cost of \$170,000. This existing machinery was bought five years ago for \$700,000 and has a current book value of \$150,000. Operations will continue at the original premises and if equipment is transferred to the new premises then the cost of replacement will be \$660,000.

All equipment has a life of 15 years from now and could generate annual cash returns of \$384,000. At the end of this period the new premises would have an estimated market value of \$1.8 million and all equipment would have negligible scrap values.

Bronze's cost of capital is 10%.

Requirements

- (i) Advise Bronze on the best way of equipping the new premises.
- (ii) Advise Bronze whether or not the new premises are worth equipping.



7 Opera Ltd

Opera Ltd is a division of Fine plc which requires each of its divisions to achieve a rate of return on capital employed of at least 10% pa. For this purpose, capital employed is defined as fixed capital and investment in stocks. This rate of return is also applied as a hurdle rate for new investment projects. Divisions have limited borrowing powers and all capital projects are centrally funded.

The following is an extract from Opera's divisional accounts:

Income Statement for the year ended 31 December 2009

	<i>\$m</i>
Turnover	120
Cost of sales	<u>(100)</u>
Operating profit	<u>20</u>

Assets employed as at 31 December 2009

	<i>\$m</i>	<i>\$m</i>
Non-current (net)		75
Current assets (including stocks \$25m)	45	
Current liabilities	<u>(32)</u>	
Net capital employed		<u>13</u> <u>88</u>

Opera's production engineers wish to invest in a new computer-controlled press. The equipment cost is \$14m. The residual value is expected to be \$2m after four years operation, when the equipment will be shipped to a customer in South America.

The new machine is capable of improving the quality of the existing product and also of producing a higher volume. The firm's marketing team is confident of selling the increased volume by extending the credit period. The expected additional sales are:

Year 1	2,000,000 units
Year 2	1,800,000 units
Year 3	1,600,000 units
Year 4	1,600,000 units

Sales volume is expected to fall over time due to emerging competitive pressures. Competition will also necessitate a reduction in price by \$0.5 each year from the \$5 per unit proposed in the first year. Operating costs are expected to be steady at \$1 per unit, and allocation of overheads (none of which are affected by the new project) by the central finance department is set at \$0.75 per unit.

Higher production levels will require additional investment in stocks of \$0.5m, which would be held at this level until the final stages of operation of the project. Customers at present settle accounts after 90 days on average.

Required:

- (a) **Determine whether the proposed capital investment is attractive to Opera, using the average rate of return on capital method, as defined as average profit-to-average capital employed, ignoring debtors and creditors. [Note: Ignore taxes]**
- (b)
 - (i) **Suggest three problems which arise with the use of the average return method for appraising new investment.**
 - (ii) **In view of the problems associated with the ARR method, why do companies continue to use it in project appraisal?**
- (c) **Briefly discuss the dangers of offering more generous credit, and suggest ways of assessing customers' creditworthiness.**



PRACTICE QUESTIONS

8 Theatre

Theatre Co needs to increase production capacity to meet increasing demand for an existing product, 'Fiber', which is used in food processing. A new machine, with a useful life of four years and a maximum output of 600,000 kg of Fiber per year, could be bought for \$800,000, payable immediately. The scrap value of the machine after four years would be \$30,000. Forecast demand and production of Fiber over the next four years is as follows:

Year	1	2	3	4
Demand (kg)	1.4 million	1.5 million	1.6 million	1.7 million

Existing production capacity for Fiber is limited to one million kilograms per year and the new machine would only be used for demand additional to this.

The current selling price of Fiber is \$8.00 per kilogram and the variable cost of materials is \$5.00 per kilogram. Other variable costs of production are \$1.90 per kilogram. Fixed costs of production associated with the new machine would be \$240,000 in the first year of production, increasing by \$20,000 per year in each subsequent year of operation.

Theatre Co pays tax one year in arrears at an annual rate of 30% and can claim capital allowances (tax-allowable depreciation) on a 25% reducing balance basis. A balancing allowance is claimed in the final year of operation.

Theatre Co uses its after-tax weighted average cost of capital when appraising investment projects. It has a cost of equity of 11% and a before-tax cost of debt of 8.6%. The long-term finance of the company, on a market-value basis, consists of 80% equity and 20% debt.

Required:

- (a) Calculate the net present value of buying the new machine and advise on the acceptability of the proposed purchase (work to the nearest \$1,000).
- (b) Calculate the internal rate of return of buying the new machine and advise on the acceptability of the proposed purchase (work to the nearest \$1,000).
- (c) Explain the difference between risk and uncertainty in the context of investment appraisal, and describe how sensitivity analysis and probability analysis can be used to incorporate risk into the investment appraisal process.



PRACTICE QUESTIONS

9 Ballet plc

Ballet plc, a manufacturer of speciality chemicals, has been reported to the anti-pollution authorities on several occasions in recent years, and fined substantial amounts for making excessive toxic discharges into local rivers. Both the environmental lobby and Ballet's shareholders demand that it clean up its operations.

It is estimated that the total fines it may incur over the next four years can be summarised by the following probability distribution (all figures are expressed in present values):

<i>Level of fine</i>	<i>Probability</i>
\$0.5m	0.3
\$1.4m	0.5
\$2.0m	0.2

ABC Ltd, a firm of environmental consultants; has advised that new equipment costing \$1m can be installed to virtually eliminate illegal discharges. Unlike fines, expenditure on pollution control equipment is tax-allowable via a 25% writing-down allowance (reducing balance). The rate of corporate tax is 33%, paid with a one-year delay. The equipment will have no resale value after its expected four-year working life, but can be in full working order immediately prior to Ballet's next financial year.

A European Union Common Pollution Policy grant of 25% of gross expenditure is available, but with payment delayed by a year. Immediately on receipt of the grant from the EU, Ballet will pay 20% of the grant to ABC as commission. These transactions have no tax implications for Ballet.

A disadvantage of the new equipment is that it will raise production costs by \$30 per tonne over its operating life. Current production is 10,000 tonnes per annum, but expected to grow by 5% per annum compound. It can be assumed that other production costs and product price are constant over the next four years. No change in working capital is envisaged.

Ballet applies a discount rate of 12% after all taxes to investment projects of this nature. All cash inflows and outflows occur at year ends.

Required:

- (a) Calculate the expected net present value of the investment assuming a four-year operating period. Briefly comment on your results.
- (b) Write a memorandum to Ballet's management as to the desirability of the project, taking into account both financial and non-financial criteria.



PRACTICE QUESTIONS

10 Glitter Railways

Glitter Railways plc, which has a financial year-end of 31 December, operates a rail passenger service between two major cities in England. It is currently negotiating with the regulatory authorities about a five year extension and enhancement of its existing contract. Glitter Railways has forecast passenger use over the next five year period to 31 December 2010 and, based on its proposed carriage capacity, has calculated the following figures:

Five year projections:

Number of carriages used on the line:	8
Maximum passengers per carriage:	55
Average occupancy rate:	60%
Average number of return journeys per day:	10
Average price per return trip:	\$12
Number of days operating per year:	340

Contribution per unit (sales price less variable costs) is expected to remain at a constant 35% of price over the period. Additional fixed costs of \$1m per annum will be incurred on the new project. The management accountant has suggested that, in addition, the existing fixed overhead apportionment be increased by \$200,000 per annum to reflect the increased activities relating to this part of the business. If the contract is renewed, other services offered by Glitter Railways will be reduced to enable capacity expansion on the new contract. This will involve the loss of a long-standing contract, which was expected to continue indefinitely, worth \$250,000 in pre-tax net cash inflows per annum.

One of the conditions of a successful new bid is that a minimum investment of \$5m, in support equipment to enhance the existing service, is required at the start of the new contract on 31 December 2005. This equipment will no longer be needed to support the contract after four years and will be disposed of for \$0.5m on 31 December 2009. Capital allowances are available for these transactions. A balancing charge or allowance would arise on disposal of the asset. The investment in this asset should be treated separately from any other asset investment for tax purposes (ignore any pooling requirements). Assume all tax payments and allowances arise at the end of the year in which the taxable transactions arise (in other words, not delayed). Assume that all operating cash inflows arise at the relevant year-end.

Other relevant information:

After tax discount rate per annum:	10%
Corporation tax rate:	30%
Writing down allowance:	25% per annum, reducing balance

Required:

- (a) Calculate separately the present value of the net operating cash flows (after payment of corporation tax and using annuities and perpetuities where appropriate), and the capital flows (investment, disposal and related tax flows). Assess if it is beneficial for Glitter Railways to begin the new contract on 31 December 2005.

Express all calculations in this and other parts of the question to the nearest \$1000. State any assumptions you make.

- (b) The Chairman of Glitter Railways is concerned about the risk of the project, particularly with respect to the average price charged.

Calculate the sensitivity of the project in relation to the average price charged.

Assume, in your answer that all other factors are as per your analysis in part (a).



PRACTICE QUESTIONS

- (c) On reviewing the initial proposal from your answer to part (a), the regulatory authorities are now insisting that further investment of \$7m be made to ensure carriage availability to meet targets for the level of proposed service provision. This would not involve the purchase of additional carriages. Assume that by incorporating the additional \$7m investment on top of the existing \$5m, a total NPV at 31 December 2005 of \$9.220m (negative) for the capital cash flows only will arise.

Required:

- (i) calculate the occupancy rate required to break even (that is, to produce a zero NPV)
- (ii) calculate the length of the contract required to break even (that is, to produce a zero NPV). Assume, in your answers to each case that all other factors are as per your analysis in part (a).
- (d) Write a report to the Chairman of Glitter Railways, in your capacity as an external consultant, explaining: (i) what is meant by business risk; (ii) the methods of estimating business risk in the context of NPV; and (iii) the methods of reducing business risk.

11 Orange

Orange.com has just issued convertible debentures with an 8% per annum coupon to the value of \$5m. The nominal value of the debentures is \$100 and the issue price was \$105. The conversion details are that 45 shares will be issued for every \$100 convertible debentures held with a date for conversion in five years exactly. Redemption, should the debenture not be converted, will also take place in exactly five years. Debentures will be redeemed at \$110 per \$100 nominal convertibles held. It is widely expected that the share price of the company will be \$4 in five years' time.

Assume an investor required return of 15%.

Ignore taxation in your answer.

Required:

- (a) Briefly explain why convertibles might be an attractive source of finance for companies.
- (b) (i) Estimate the current market value of the debentures, assuming conversion takes place, using net present value methods and assess if it is likely that conversion will take place.
- (ii) Identify and briefly comment on a single major reservation you have with your evaluation in part b(i).
- (c) Explain why an issuing company seeks to maximise its conversion premium and why companies can issue convertibles with a high conversion premium.
- (d) Explain what is meant by the concept of intermediation (the role of a banking sector) and how such a process benefits both investors and companies.



PRACTICE QUESTIONS

12 Blue**Requirements**

- (a) Blue plc is equity financed by 500,000 50c ordinary shares. Current market value is 30c and the annual dividend of \$12,000 is about to be paid.

Calculate Blue's cost of capital.

- (b) Red plc is financed by equity shares having a market value of \$3. A dividend of 25c has just been paid and this compares favourably with the dividend of 15c paid four years ago.

Calculate Red's cost of capital.

- (c) White plc is financed by 400,000 \$1 ordinary shares and \$600,000 12% debentures. The market values are \$1.40 ex div and \$90% respectively. A dividend of 14c has just been paid and dividends have been growing at 6% p.a. Interest is shortly to be paid on the debentures which are redeemable at a 5% premium in 6 years time.

Ignoring taxation calculate White's cost of capital.

- (d) Yellow plc is financed by 1 million 50c ordinary shares, market value \$1.30 and \$500,000 5% debentures valued at 95%. A dividend of 15c is about to be paid and dividends have always been constant. Interest on the debentures is soon to be paid and redemption is at par in 5 years time.

If corporation tax is at 35% calculate Yellow's cost of capital.

13 XYZ**Requirements**

- (a) X plc is financed by 100,000 50c ordinary shares with an ex div market value of \$1.30 and \$80,000 of 9% irredeemable loan inventory with an ex interest market value of 95 per cent. The dividend which has just been paid is the constant annual dividend of 15c per share.

Corporation tax is at 35%. Find K_e , K_d , E and D, and hence the WACC.

- (b) Y limited is partly financed by 9% redeemable debentures currently valued at \$75, interest having just been paid. The debentures are redeemable in 5 years time at a premium of 10%.

Calculate the cost of these debentures to the company if tax is at 35%.

- (c) Z plc has \$1m 8% redeemable debentures in issue. Interest is paid half yearly on June 30 and December 31 and the current ex-interest market price on July 1 2005 is \$97. Redemption is at par on December 31 2009.

Calculate the annual cost of the debentures. Tax is at 35%.



14 Little plc

- (a) Discuss briefly four techniques a company might use to hedge against the foreign exchange risk involved in foreign trade.
- (b) Little plc is a medium sized UK company with export and import trade with the USA. The following transactions are due within the next six months. Transactions are in the currency specified.

Purchases of components, cash payment due in three months: \$116,000.

Sale of finished goods, cash receipt due in three months: \$197,000.

Purchase of finished goods for resale, cash payment due in six months: \$447,000.

Sale of finished goods, cash receipt due in six months: \$154,000.

Exchange rates (London market)

	\$/£
Spot	1.7106–1.7140
Three months forward	0.82–0.77 cents premium
Six months forward	1.39–1.34 cents premium

<i>Three months or six months</i>	<i>Interest rates Borrowing</i>	<i>Lending</i>
Sterling	12.5%	9.5%
Dollars	9%	6%

Calculate the net sterling receipts and payments that Little might expect for both its three and six month transactions if the company hedges foreign exchange risk on

- (i) the forward foreign exchange market;
(ii) the money market.

15 Banks

Your managing director has received forecasts of US\$ exchange rates in two years time from three leading banks.

\$/£ forecasts 31 December 2009

Onebank	1.25
Twobank	1.55
Threebank	1.68

The current spot mid-rate (December 2007) is \$1.5240/£

A non-executive director of your company has suggested that in order to forecast future exchange rates, the interest rate differential between countries should be used. She states that 'as short term interest rates are currently 6% in the UK, and 8.5% in the USA, the exchange rate in two years time will be \$1.597/£.

You have been asked by your managing director to prepare a brief report discussing

- (a) The likely validity of the non-executive director's estimate
(b) Possible reasons for the wide spread of forecasts by the banks.



Paper F9

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PRACTICE ANSWERS

1 Crystal Ltd

- (a) Overtrading occurs in a business where the capital base is inappropriate to the level of operational activity. Where a business expands rapidly, as in the case of Crystal Ltd, there is a need to increase the level of working capital and non-current assets in line with the increase in sales. This means, in turn, that the business must be adequately funded by appropriate long-term and short-term sources of finance. Failure to do this can result in difficulties in supplying customers (as inventory levels will be insufficient to meet demand) and liquidity problems.

Liquidity problems may take various forms such as exceeding overdraft limits, failing to pay interest on borrowings or to make capital repayments on due dates, slow payment of trade payables etc. Management of the business during a period of overtrading is often reduced to simply reacting to particular crises as they occur e.g. dealing with an irate creditor demanding payment, finding money to pay wages and salaries etc. This can be extremely time consuming and can detract managers from more profitable use of their time. At the extreme, overtrading can result in the business having to cease trading because it does not have the cash available to meet obligations as they arise.

- (b) Overtrading is a symptom of weak financial management of the business. It can arise in a relatively young business, such as Crystal Ltd, from a failure to foresee the growth potential of the business and, as a result, failing to invest sufficient start-up capital in order to deal with the level of demand for the products. Under capitalisation may also occur because the owners simply do not have sufficient resources to invest in the business and are unable to convince others to invest in the business. Errors and miscalculations may also result in overtrading such as the failure to forecast levels of profits and cash flows to materialise thereby placing a strain on working capital and fixed asset requirements, failure to control costs leading to a drain on liquidity and investment in non-current assets without sufficient finance being in place.

In order to deal with the problem of overtrading it is necessary for a business to ensure that the permanent capital base matches the level of activity. This may mean an increase in the equity and/or the borrowings of the business. However, where the business is unable to find new finance it will be necessary to reduce the level of activity in line with the available capital of the business. This is likely to mean turning away profitable opportunities in order to ensure there is a long-term future for the business. It is also important to ensure that the capital available is used as effectively and efficiently as possible. This means monitoring fixed asset utilisation and tight control over working capital requirements.

- (c) A number of ratios may be used to detect symptoms of overtrading. Six such ratios are as follows:

$$\begin{aligned} \text{Average inventory holding period} &= \frac{\text{Average inventory}}{\text{Cost of sale}} \times 12 \\ &= \frac{(22,000 + 26,000)/2}{422,000} \times 12 \\ &= \mathbf{0.7 \text{ months}} \end{aligned}$$

The average inventory holding period is less than one month. This seems rather low and may suggest that the company is unable to invest sufficiently in inventories so as to meet the requirements of its customers. Too low a inventory holding period can, therefore, lead to lost customer goodwill and lost sales.

$$\begin{aligned} \text{Average payables period} &= \frac{\text{Trade payables}}{\text{Credit purchases}} \times 12 \\ &= \frac{88,000}{426,000} \times 12 \\ &= \mathbf{2.5 \text{ months}} \end{aligned}$$

This ratio reveals that the company is taking 2½ months, on average, to pay trade payables. This seems rather a long period and may indicate liquidity problems.

$$\text{Average receivables period} = \frac{\text{Trade receivables}}{\text{Credit sales}} \times 12$$



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$$= \frac{59,000}{660,000} \times 12$$

$$= \mathbf{1.1 \text{ months}}$$

This ratio reveals that receivables are taking an average of 1.1 months to pay amounts owing. Where a company is overtrading, it may decide to reduce the receivables payment period to a minimum in order to improve its cash flows.

$$\text{Sales/non-current assets} = \frac{\text{Sales}}{\text{non-current assets}}$$

$$= \frac{660,000}{84,000}$$

$$= \mathbf{7.9 \text{ times}}$$

This ratio reveals that for every \$ invested in non-current assets there is \$7.90 generated in sales during the year. A very high ratio may suggest that the company has under-invested in non-current assets for the given level of sales.

$$\text{Acid-test} = \frac{\text{Current assets (less inventory)}}{\text{Current liabilities}}$$

$$= \frac{59,000}{105,000}$$

$$= \mathbf{0.6 : 1}$$

This ratio compares the liquid assets of the business with the maturing obligations. In this particular case, it shows that the company has insufficient liquid assets to meet short-term obligations. The company is, therefore, in a weak liquidity position.

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

$$= \frac{85,000}{105,000}$$

$$= \mathbf{0.8 : 1}$$

This ratio compares the current assets with the maturing obligations. It is a further measure of liquidity. The ratio reveals that the current assets do not cover the maturing obligations of the company. Although this is a less stringent test of liquidity than the acid-test ratio, the ratio helps confirm the liquidity problems of the company.



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2 Diamond Ltd

- (a) The following liquidity ratios may be calculated

$$\text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}} = \frac{141,000}{213,000} = 0.66 : 1$$

$$\text{Acid test} = \frac{\text{Current assets less inventory}}{\text{Current liabilities}} = \frac{89,000}{213,000} = 0.42:1$$

The ratios seem very low for a business of this nature. The current ratio indicates that the business does not have significant liquid assets to cover its short-term liabilities by a significant margin. The acid-test ratio, which is a more stringent test of liquidity reveals an even bleaker picture. The business has a large bank overdraft and clearly relies on the continuing support of the bank. Given the weak liquidity position of the business, the decision to distribute dividends for the year is puzzling.

- Note: Other ratios such as the average settlement period for payables and times interest earned ratio could have been used to add to the picture.

- (b) The operating cycle of the business may be calculated as follows:

	<i>Days</i>
Average inventory holding period	
$\frac{\text{Average inventories}}{\text{Cost of sales}} = \frac{(36,000 + 52,000)/2}{504,000} \times 365$	32
Average settlement days for receivables	
$\frac{\text{Average receivables}}{\text{Credit sales}} = \frac{89,000}{835,000} \times 365$	39
Less	
Average settlement period for payables	
$\frac{\text{Average payables}}{\text{Credit purchases}} = \frac{64,000}{520,000} \times 365$	(45)
	26

- (c) Although a low operating cash cycle will help improve the liquidity of the business, there may well be costs associated with reducing the cash cycle further. In order to achieve the required reduction there must be:

- (i) a reduction in the inventory holding period, or
- (ii) a reduction in the average settlement period for receivables, or
- (iii) an increase in the settlement period for payables, or
- (iv) some combination of the above.

A reduction in the inventory holding period (which at 32 days does not appear to be excessive), may result in stockouts and a subsequent loss of sales and customer goodwill. A reduction in the receivables period may also lead to a loss of sales and customer goodwill. (The industry norm for credit periods allowed to receivables should be considered before action is taken in reducing the average settlement period). An increase in the average settlement period taken for payables may result in lost discounts, and a loss of supplier goodwill which may lead, in turn to future problems when ordering goods.

As the operating cash cycle does not appear to be unduly long, some of the difficulties described may well arise if there is an attempt to reduce the cycle by a significant amount.

- (e) A sale and leaseback agreement would involve selling the freehold premises to a financial institution and, at the same time, agreeing to lease the property back from the new owners for a specified rental. This arrangement would have the advantage of providing an immediate injection of cash into the business from the sale, yet would still allow the business to occupy the property. Rental payments made under the lease agreement would also attract tax relief.

However, there are potential disadvantages with such an arrangement. Although rental payments may be quite low in the early years of an agreement, there are usually regular rent reviews and so payments may rise steeply over time. At the end of the lease period the business will be obliged to vacate the property unless a further lease agreement can be successfully negotiated or there is a re-purchase option on the property. The sale of the property



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may result in the loss of future capital gains and any capital gains on the property made to date will be taxable. The Statement of Financial Position reveals that the business has debentures outstanding which are secured. If they are secured on the freehold property, permission to sell must be sought from the debenture holders. Although a sale and leaseback agreement would clear the overdraft, it will not alleviate future liquidity problems which will be exacerbated by the rental payments.

3 Sapphire

$$(a) \quad EOQ = \sqrt{\frac{2CD}{H}} = \sqrt{\frac{2 \times 32 \times 25,000}{4 + (0.15 \times 16)}} = \sqrt{250,000} \text{ litres}$$

	800 litres per order		500 litres per order	
Annual costs:		\$		\$
Holding costs	$(\frac{800}{2} \times £6.4)$	2,560	$(\frac{500}{2} \times £6.4)$	1,600
Ordering costs	$(\frac{25,000}{800} \times £32)$	1,000	$(\frac{25,000}{500} \times £32)$	1,600
		<u>\$3,560</u>		<u>\$3,200</u>

The annual saving would be $\$(3,560 - 3,200) = \360 .

(b) The new EOQ above 500 is caused by the reduction in h to $\$4 + (15\% \text{ of } \$15.20) = 6.28$.

$$EOQ = \sqrt{\frac{2CD}{H}} = \sqrt{\frac{2 \times 32 \times 25,000}{6.28}} = 504.75 \text{ litres, say } 505 \text{ litres.}$$

	Order 505 units \$	Order 1,000 units \$
Cost of purchases:		
(i) at \$1 5.20 ($\times 25,000$)	380,000	
(ii) at \$1 4.80 ($\times 25,000$)		370,000
Holding costs:		
(i) at \$6.28	1,586	
(ii) at $\$4 + (15\% \text{ of } \$14.80)$		3,110
Ordering costs at \$32		
(i) 50 orders per annum		
(ii) $\frac{25,000}{505}$ orders per annum	1,584	
(iii) 25 orders per annum		800
	<u>\$383,170</u>	<u>\$373,910</u>

The optimal order quantity is now 1,000 units, to take advantage of the bulk purchase discounts. This is $\$(383,170 - 373,910) = \$9,260$ per annum cheaper than ordering 500 litres with each order.



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4 Ruby plc

- (a) The benefits of the proposed policy change are as follows.

Trade terms are 40 days, but receivables are taking $365 \times 0.550/4 = 50$ days

Current level of receivables = \$550,000

Cost of 1% discount = $0.01 \times 4m \times 2/3 = \$26,667$

Proposed level of receivables = $(4,000,000 - 26,667) \times (26/365) = \$283,000$

Reduction in receivables = $550,000 - 283,000 = \$267,000$

Debtors appear to be financed by the overdraft at an annual rate of 9%

Reduction in financing cost = $267,000 \times 0.09 = \$24,030$

Reduction of 0.6% in irrecoverable debts = $\$4m \times 0.006 = \$24,000$

Salary saving from early retirement = \$12,000

Total benefits = $24,030 + 24,000 + 12,000 = \$60,030$

Net benefit of discount = $60,030 - 26,667 = \$33,363$

A discount for early payment of 1 per cent will therefore lead to an increase in profitability for Ruby plc.

- (b) Short-term sources of debt finance include overdrafts and short-term loans. An overdraft offers flexibility but since it is technically repayable on demand, it is a relatively risky source of finance and a company could experience liquidity problems if an overdraft were called in, until an alternative source of finance were found. The danger with a short-term loan as a source of finance is that it may be renewed on less favourable terms if economic circumstances have deteriorated at its maturity, leaving the company vulnerable to short-term interest rate changes.

Short-term finance will be cheaper than long-term finance, although this is based on the assumption of a normal shape to the yield curve. Economic circumstances could invert the yield curve, for example if short-term interest rates have been increased in order to curb economic growth or to dampen inflationary pressures.

Long-term sources of debt finance include loan inventory, debentures and long-term loans. These are relatively secure forms of finance: for example, if a company meets its contractual obligations on debentures in terms of interest payments and loan covenants it will not have to repay the finance until maturity. The risk for the company is therefore lower if it finances working capital from a long-term source.

However, long-term finance is more expensive than short-term finance. The shape of the normal yield curve, for example, indicates that providers of debt finance will expect compensation for deferred consumption and default risk, as well as protection against expected inflation. The choice between short-term and long-term debt for the financing of working capital is hence a choice between cheaper but riskier short-term finance and more expensive but less risky long-term debt.

- (c) Working capital policies on the method of financing working capital can be characterised as conservative, moderate and aggressive. A conservative financing policy would involve financing working capital needs predominantly from long-term sources of finance. If current assets are analysed into permanent and fluctuating current assets, a conservative policy would use long-term finance for permanent current assets and some of the fluctuating current assets. Such a policy would increase the amount of lower-risk finance used by the company, at the expense of increased interest payments and lower profitability.

Ruby plc is clearly not pursuing a conservative financing policy, since long-term debt only accounts for 2.75% (40/1,450) of non-cash current assets. Rather, it seems to be following an aggressive financing policy, characterised by short-term finance being used for all of fluctuating current assets and most of the permanent current assets as well. Such a policy will decrease interest costs and increase profitability, but at the expense of an increase in the amount of higher-risk finance used by the company.

Between these two extremes in policy terms lies a moderate or matching approach, where short-term finance is used for fluctuating current assets and long-term finance is used for permanent current assets. This is an expression of the matching principle, which holds that the maturity of the finance should match the maturity of the assets.

- (d) The objectives of working capital management are often stated to be profitability and liquidity. These objectives are often in conflict, since liquid assets earn the lowest return and so liquidity is achieved at the expense of profitability. However, liquidity is needed in the sense that a company must meet its liabilities as they fall due if it is to remain in business. For this reason cash is often called the lifeblood of the company, since without cash a company would quickly fail. Good working capital management is therefore necessary if the company is to survive and remain profitable.



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management helps to achieve this by minimising the cost of investing in current assets. Good credit management, for example, aims to minimise the risk of irrecoverable debts and expedite the prompt payment of money due from receivables in accordance with agreed terms of trade. Taking steps to optimise the level and age of receivables will minimise the cost of financing them, leading to an increase in the returns available to shareholders.

A similar case can be made for the management of inventory. It is likely that Ruby plc will need to have a good range of stationery and office supplies on its premises if customers' needs are to be quickly met and their custom retained. Good inventory management, for example using techniques such as the economic order quantity model, ABC analysis, inventory rotation and buffer inventory management can minimise the costs of holding and ordering inventory. The application of just-in-time methods of inventory procurement and manufacture can reduce the cost of investing in inventory. Taking steps to improve inventory management can therefore reduce costs and increase shareholder wealth.

Cash budgets can help to determine the transactions need for cash in each budget control period, although the optimum cash position will also depend on the precautionary and speculative need for cash. Cash management models such as the Baumol model and the Miller-Orr model can help to maintain cash balances close to optimum levels.

The different elements of good working capital management therefore combine to help the company to achieve its primary financial objective.

5 Pearl plc

(a) Memorandum

Memo to: Pearl plc Main Board
 From: An Accountant
 Subject: Alternative Financial Strategies

The present policy is termed a 'matching' financial policy. This attempts to match the maturity of financial liabilities to the lifetime of the assets acquired with this finance. It involves financing long-term assets with long-term finance such as equity or loan inventory and financing short-term assets with short-term finance such as trade credit or bank overdrafts. This avoids the potential wastefulness of over-capitalisation whereby short-term assets are purchased with long-term finance ie the company having to service finance not continuously invested in income-earning assets. It also avoids the dangers of under-capitalisation which entails exposure to finance being withdrawn when the company is not easily able to liquidate its assets. In practice, some short-term assets may be regarded as permanent and it may be thought sensible to finance these by long-term finance and the fluctuating remainder by short-term finance.

The proposed policy is an 'aggressive policy' which involves far heavier reliance on short-term finance, thus attempting to minimise long-term financing costs. This requires very careful manipulation of the relationship between payables and receivables (maximising trade payables and minimising receivables), and highly efficient inventory control and cash management. While it may offer financial savings, it exposes the company to the risk of illiquidity and hence possible failure to meet financial obligations. In addition, it involves greater exposure to interest rate risk. The company should be mindful of the inverse relationship between interest rate changes and the value of its assets and liabilities.

Before embarking on such an aggressive policy, the Board should consider the following factors:

- ◆ How good are we at forecasting cash inflows and outflows? How volatile is our net cash flow? Is there any seasonal pattern evident?
- ◆ How efficiently do we manage our cash balances? Do we ever have excessive cash holdings which can be reduced by careful and active management?
- ◆ Do we have suitable information systems to provide early warnings of illiquidity?
- ◆ Do we have any holdings of marketable securities that can be realised if we run into unexpected liquidity problems?
- ◆ How liquid are our non-current assets? Can any of these be converted into cash without unduly disrupting productive operations?
- ◆ Do we have any unused long- or short-term credit lines? These may have to be utilised if we meet liquidity problems.
- ◆ How will the inventory market perceive our switch towards a more aggressive and less liquid financial policy?

(b) Cash management policy

To determine the net benefits of each policy, both cash costs and opportunity costs have to be considered.



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First, consider the cash management costs expected from each policy over the course of the forthcoming year.

Policy 1 Selling securities

The cash transaction costs are partly offset by small interest earnings on the average cash balance held. Transactions costs:

Optimal proceeds per sale:	$Q = \sqrt{\frac{2 \times \$1.5m \times \$25}{0.12}} = \$25,000$	
No of sales	$= \frac{\$1.5m}{\$25,000}$	= 60
Transaction costs	$= 60 \times \$25$	= \$1,500
Average cash balances:	$= \frac{\$25,000}{2}$	= \$12,500
Interest on short-term deposits:		
Av cash balance \times 5%	$= \$12,500 \times 5\%$	= <u>(\$625)</u>
Total management costs		\$875

Policy 2 Secured loan facility

Assuming an even run-down in cash balances:

Interest charges	$= \$1.5m \times 14\%$	= \$210,000
Offsetting interest receipts:		
(= average balance \times 9%)	$= \frac{\$1.5m}{2} \times 9\%$	= (\$67,500)
Arrangement fee:		= \$5,000
Total management costs		\$147,500

Hence, the policy of periodic security sales appears greatly superior in cost terms by $[\$147,500 - \$875] = \$146,625$. However, this simple comparison ignores the income likely to be received from the portfolio of securities under each policy. By taking the secured loan, the company preserves intact its expected returns of $[12\% \times \$1.5m = \$180,000]$ from the portfolio. Conversely, making periodic sales from the portfolio during the year lowers the returns to: $[\text{average holding of securities} \times 12\%] = \frac{\$1.5m}{2} \times 12\% = \$90,000$

The net benefits from the two policies can be shown thus:

Security sales

Income from portfolio	\$90,000		
Net management costs	(\$875)	Net income	\$89,125

Loan alternative

Income from portfolio	\$180,000		
Net management costs	(\$147,500)	Net income	\$32,500
		Difference	\$56,625

The policy of periodic security sales thus offers greater benefits. However, it is necessary to consider also the company's net worth position at the end of the year ahead. By relying on security sales, the company would avoid the need to repay a loan at the end of the year, but, against this, will have no holdings of securities to fall back on. Moreover, the capital value of this portfolio is uncertain, due to exposure to variation in the return from the portfolio. For example, if money market rates rose over the year, the capital value of the portfolio would probably fall, although the extent of the decrease in value would depend on the nearness to maturity of the securities.

(c) Limitations of cash management policy

- It assumes a steady run-down in cash holdings between successive security sales. In reality, the pattern of cash holdings is likely to be far more erratic, with exceptional demands for cash punctuated by periods of excessive liquidity. However, the period between sales is short enough and the transaction cost low enough to allow flexibility in cash management.

- It allows for no buffer inventory of cash. In reality, security sales are unlikely to be made when cash balances



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drop to zero, but when they fall to a level deemed to be the safe minimum.

- It uses a 'highly uncertain' estimate of the return from the portfolio. Emerald should investigate the implications of assuming alternative (higher and lower) rates, and perhaps determine a 'break-even rate' at which the two policies are equally attractive. In this example, the actual rate would have to be well above 12% to achieve this result.
- There may be economies in bulk-selling of securities, although exploiting these would increase the holding cost.

6 Gold

(a) Gold

Initial investment		\$100,000
Average investment	$\frac{100,000 + 15,000}{2} =$	\$57,500
Total return		\$107,000
Depreciation		\$ 85,000
		<u>\$ 22,000</u>
∴ Average return		\$4,400

$$(i) \text{ ARR} = \frac{4,400}{57,500} = 7.65\%$$

$$(ii) \text{ ARR} = \frac{4,400}{100,000} = 4.4\%$$

(iii) Payback period

Time	Cash flow	Cumulative cash flow
0	(100,000)	-
1	25,000	(75,000)
2	34,000	(41,000)
3	25,000	(16,000)
4	15,000	(1,000)
5	23,000	22,000

$$\text{Payback period} = 4 + \frac{1}{8} = \mathbf{4.125 \text{ years}}$$

(b) Silver NPV:

Time	\$	25% factor	PV	15% factor	PV
0	(183,000)	1	(183,000)	1	(183,000)
1-4	70,000	(W1) 2.362	<u>165,340</u>	2.855	<u>199,850</u>
			<u>(17,660)</u>		<u>16,850</u>

$$\therefore \text{IRR} = 15 + (10 \times \frac{16,850}{34,510}) = \mathbf{19.88\%}$$

$$\text{W1: } \frac{1 - (1+r)^{-n}}{r} = \frac{1 - (1.25)^{-4}}{0.25} = 2.362$$

(c) Bronze

(i) How to equip new premises:

Cost of new equipment = \$1 million

Cost of existing equipment if transferred = \$170,000 + \$660,000 = \$830,000

∴ existing equipment is the cheapest,

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(ii) Are new premises worthwhile?

Time		\$'000	10% factor	PV
0	Factory MV	(2,600)	1	(2,600)
0	Equipment	(830)	1	(830)
1-15	Returns	384	7.6061	2,920
15	Factory MV	1,800	0.2394	<u>431</u>
				<u>(79)</u>

∴ It is not worthwhile.

7 Opera Ltd

(a) Current return on capital employed

$$= \text{Operating profit/capital employed} = \$20m/(\$75m + \$25m) = \$20m/\$100m = 20\%$$

● Analysis of the project.

Project capital requirements are \$14m fixed capital plus \$0.5m inventories. The annual depreciation charge (straight line) is:

$$(\$14m - \text{expected residual value of } \$2m)/4 = \$3m \text{ pa}$$

Profit profile (\$m)					
	Year	1	2	3	4
Sales		(5.00 × 2m) = 10.00	(4.50 × 1.8m) = 8.10	(4.00 × 1.6m) = 6.40	(3.50 × 1.6m) = 5.60
Op: costs		(2.00)	(1.80)	(1.60)	(1.60)
Fixed costs		(1.50)	(1.35)	(1.20)	(1.20)
Depreciation		(3.00)	(3.00)	(3.00)	(3.00)
Profit		<u>3.50</u>	<u>1.95</u>	<u>0.60</u>	<u>(0.20)</u>
<i>Capital employed (start-of-year):</i>					
Fixed		14.00	11.00	8.00	5.00
Stocks		0.50	0.50	0.50	0.50
Total		<u>14.50</u>	<u>11.50</u>	<u>8.50</u>	<u>5.50</u>

$$\text{Average rate of return} = \frac{\text{Average profit}}{\text{Average capital employed}} = \frac{\$5.85/4}{\$40.0/4} = \frac{\$1.46}{\$10.0} = 14.6\%$$

Note that if receivables were to be included in the definition of capital employed, this would reduce the calculated rate of return, while the inclusion of payables would have an offsetting effect. However, using the ARR criterion as defined, the proposal has an expected return above the minimum stipulated by Fine plc. It is unlikely that the managers of Opera will propose projects which offer a rate of return below the present 20% even where the expected return exceeds the minimum of 10%. To undertake projects with returns in this range will depress the overall divisional return and cast managerial performance in a weaker light.

However, it is unlikely that the senior managers of the Opera subsidiary would want to undertake the project.

(b) ARR

(i) Three problems

The ARR can be expressed in a variety of ways, and is therefore susceptible to manipulation. Although the question specifies average profit to average capital employed, many other variants are possible eg, average profit to initial capital, which would raise the computed rate of return. It is also susceptible to variation in accounting policy by the same firm over time, or as between different firms at a point in time. For example, different methods of depreciation produce different profit figures and hence different rates of return.

Perhaps, most fundamentally, it is based on accounting profits expressed net of deduction for depreciation provisions, rather than cash flows. This effectively results in double-counting for the initial outlay ie, the capital cost is allowed for twice over, both in the numerator of the ARR calculation and also in the denominator. This is likely to depress the measured profitability of a project and result in rejection of some worthwhile investment. Finally, because it simply averages the profits, it makes no allowance for the timing



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of the returns from the project.

(ii) *Continued use*

The continuing use of the ARR method can be explained largely by its utilisation of Statement of Financial Position and Income Statement magnitudes familiar to managers, namely 'profit' and 'capital employed'. In addition, the impact of the project on a company's financial statements can also be specified. Return on capital employed is still the commonest way in which business unit performance is measured and evaluated, and is certainly the most visible to shareholders. It is thus not surprising that some managers may be happiest in expressing project attractiveness in the same terms in which their performance will be reported to shareholders, and according to which they will be evaluated and rewarded.

(c) **Credit worthiness**

Opera intends to achieve a sales increase by extending its debtor collection period. This policy carries several dangers. It implies that credit will be extended to customers for whom credit is an important determinant of supplier selection, hinting at financial instability on their part. Consequently, the risk of later than expected, or even no payment, is likely to increase. Although losses due to default are limited to the incremental costs of making these sales rather than the invoiced value, Opera should recognise that there is an opportunity cost involved in tying up capital for lengthy periods. In addition, companies which are slow payers often attempt to claim discounts to which they are not entitled. Opera may then face the difficult choice between acquiescence in such demands versus rejection, in which case, it may lose repeat sales.

The creditworthiness of customers can be assessed in several ways:

Analysis of accounting statements

In the case of companies which publish their annual accounts, or file them at Companies House, key financial ratios can be examined to assess their financial stability. However, these almost certainly will be provided in arrears and may not give a true indication of the companies' current situation. Some customers may be prepared to supply more up-to-date accounts directly to the seller, although these are unlikely to have been audited.

Analysis of credit reports

It may be possible to obtain detailed assessment of the creditworthiness of customers from other sources, such as their bankers, specialist credit assessment agencies such as Dun & Bradstreet, and from trade sources such as other companies who supply them. These assessments are likely to be more up-to-date than company accounts, but will inevitably be more subjective.

Previous experience

If the firm has supplied the customer in the past, its previous payment record will be available.

Cash-only trial period

If accounting and other data is sparse, and there is no previous trading record with the customer, the seller may offer a trial period over which cash is required, but if the payment record is acceptable (eg, if the customer's cheques always clear quickly), further transactions may be conducted on credit.

Background information

General background information on the industry in which the customer operates will generate insights into the financial health of companies in that sector, and by implication, that of the customer. Many agencies supply such information, although it should only be used as a backup to other assessments.



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8 Theatre

(a) Net present value evaluation of investment

After-tax weighted average cost of capital = $(11 \times 0.8) + (8.6 \times (1 - 0.3) \times 0.2) = 10\%$

<i>Year</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
	<i>\$000</i>	<i>\$000</i>	<i>\$000</i>	<i>\$000</i>	<i>\$000</i>
Contribution	440	550	660	660	
Fixed costs	(240)	(260)	(280)	(300)	
Taxable cash flow	200	290	380	360	
Taxation		(60)	(87)	(114)	(108)
CA tax benefits		60	45	34	92
Scrap value				30	
After-tax cash flows	200	290	338	310	(16)
Discount at 10%	0.909	0.826	0.751	0.683	0.621
Present values	182	240	254	212	(10)
		<i>\$000</i>			
Present value of benefits		878			
Initial investment		800			
Net present value		78			

The net present value is positive and so the investment is financially acceptable. However, demand becomes greater than production capacity in the fourth year of operation and so further investment in new machinery may be needed after three years. The new machine will itself need replacing after four years if production capacity is to be maintained at an increased level. It may be necessary to include these expansion and replacement considerations for a more complete appraisal of the proposed investment.

A more complete appraisal of the investment could address issues such as the assumption of constant selling price and variable cost per kilogram and the absence of any consideration of inflation, the linear increase in fixed costs of production over time and the linear increase in demand over time. If these issues are not addressed, the appraisal of investing in the new machine is likely to possess a significant degree of uncertainty.

Workings

Annual contribution

<i>Year</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
	<i>\$000</i>	<i>\$000</i>	<i>\$000</i>	<i>\$000</i>
Excess demand (kg/yr)	400,000	500,000	600,000	700,000
New machine output (kg/yr)	400,000	500,000	600,000	600,000
Contribution (\$/kg)	1.1	1.1	1.1	1.1
Contribution (\$/yr)	440,000	550,000	660,000	660,000

Capital allowance (CA) tax benefits

<i>Year</i>	<i>Capital allowance (\$)</i>	<i>Tax benefit (\$)</i>
1	200,000 (800,000 × 0.25)	60,000 (0.3 × 200,000)
2	150,000 (600,000 × 0.25)	45,000 (0.3 × 150,000)
3	112,500 (450,000 × 0.25)	33,750 (0.3 × 112,500)
	462,500	
	30,000 (scrap value)	
	492,500	
4	307,500 (by difference)	92,250 (0.3 × 307,500)
	800,000	



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(b) Internal rate of return evaluation of investment

Year	1	2	3	4	5
	\$000	\$000	\$000	\$000	\$000
After-tax cash flows	200	290	338	310	(16)
Discount at 20%	0.833	0.694	0.579	0.482	0.402
Present values	167	201	196	149	(6)

	\$000
Present value of benefits	707
Initial investment	800
Net present value	93

$$\text{Internal rate of return} = 10 + \left[\frac{(20 - 10) \times 78}{78 + 93} \right] = 10 + 4.6 = 14.6\%$$

The investment is financially acceptable since the internal rate of return is greater than the cost of capital used for investment appraisal purposes. However, the appraisal suffers from the limitations discussed in connection with net present value appraisal in part (a).

- (c) Risk refers to the situation where probabilities can be assigned to a range of expected outcomes arising from an investment project and the likelihood of each outcome occurring can therefore be quantified. Uncertainty refers to the situation where probabilities cannot be assigned to expected outcomes. Investment project risk therefore increases with increasing variability of returns, while uncertainty increases with increasing project life. The two terms are often used interchangeably in financial management, but the distinction between them is a useful one.
- Sensitivity analysis assesses how the net present value of an investment project is affected by changes in project variables. Considering each project variable in turn, the change in the variable required to make the net present value zero is determined, or alternatively the change in net present value arising from a fixed change in the given project variable. In this way the key or critical project variables are determined. However, sensitivity analysis does not assess the probability of changes in project variables and so is often dismissed as a way of incorporating risk into the investment appraisal process.

Probability analysis refers to the assessment of the separate probabilities of a number of specified outcomes of an investment project. For example, a range of expected market conditions could be formulated and the probability of each market condition arising in each of several future years could be assessed. The net present values arising from combinations of future economic conditions could then be assessed and linked to the joint probabilities of those combinations. The expected net present value (ENPV) could be calculated, together with the probability of the worst-case scenario and the probability of a negative net present value. In this way, the downside risk of the investment could be determined and incorporated into the investment decision.

9 Ballet plc

(a) Calculation of NPV

$$EV = (0.3 \times 0.50) + (0.5 \times 1.40) + (0.2 \times 2.0) = 0.15 + 0.70 + 0.40 = \$1.25\text{m}$$

To determine the NPV of the project, Ballet must weigh the present value of the costs incurred ie the outlay and the increased production costs, against the benefits in the form of the two sets of tax reliefs relating to the increased operating costs and to the writing-down allowance and also the present value of the fines avoided. These are set out in the following table.

Item (\$m)	Year					
	0	1	2	3	4	5
Outlay	(1.000)					
EU grant		0.250				
ABC's fee		(0.050)				
Increased costs		(0.315)	(0.331)	(0.347)	(0.365)	
Tax saving at 33%			0.104	0.109	0.115	0.120
CA	0.250	0.188	0.141	0.105	0.316	
Tax saving at 33%		0.083	0.062	0.047	0.035	0.104
Net cash flows	(1.000)	(0.032)	(0.165)	(0.191)	(0.215)	0.224
Discount factor at 12%	1.000	0.893	0.797	0.712	0.636	0.567
PV	(1.000)	(0.029)	(0.132)	(0.136)	(0.137)	0.127

$$NPV = (1.307), \text{ ie } (\$1.307\text{m})$$



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Since the negative NPV exceeds the expected present value of the fines (\$1.25M) over the same period, it appears that the project is not viable in financial terms (i.e.) it is cheaper to risk the fines.

(b) Memorandum

Memo to: Ballet plc Main Board.

Subject: Proposed Pollution Control Project.

From: XYZ.

Date: 31/10/2007

On purely non-financial criteria, it can be suggested that as a regular violator of the environmental regulation, our company has a moral responsibility to install this equipment, so long as it does not jeopardise the long-term survival of the company.

But the figures appended suggest that the project is not wealth-creating for Ballet's shareholders as the EV of the fines is less than the expected NPV of the project. However, this conclusion relies on accepting the validity of the probability distribution, which is debatable. Not only are the magnitudes of the fines merely estimates, but the probabilities shown are subjective. Different decision-makers may well arrive at different assessments which could lead to the opposite decision on financial criteria.

More fundamentally, the use of the expected value principle is only reliable when the probability distribution approximates to the normal. In this case, it is slightly skewed toward the lower outcomes. But more significantly, if the distribution itself is examined more closely, it appears to indicate that there is a 70% chance (0.5+0.2) of fines of at least \$ 1.4m, which exceeds the NPV of the costs of the pollution control project. In other words, there is a 70% chance that the project will be worthwhile. It therefore seems perverse to reject it on these figures.

Moreover, given that Ballet is a persistent offender, and that the green lobby is becoming more influential, there must be a strong likelihood that the level of fines will increase in the future, suggesting that the data given are under-estimates. Higher expected fines would further enhance the appeal of the project.

It is also possible that the company may sell more output, perhaps at a higher price, if it is perceived to be more environmentally friendly and if customers are swayed by this. This may be less likely for industrial companies although it would create opportunities for self-publicity on both sides. In addition, there may be more general image effects which may foster enhanced self-esteem among the workforce, as well as increasing the acceptability of the company in the local community. It is even possible that the company's share price may benefit from managers of 'ethical' investment funds deciding to include Ballet in their portfolios.

Finally, this may be only a short-term solution. As the operating life of the equipment is only four years, we will face a further investment decision after this period, although technological and legal changes may well have altered the situation by then.



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10 Glitter Railways

(a) Data

Discount rate (%)	10
Tax rate (%)	30
Variable cost proportion (%)	65
Occupancy rate (%)	60
No. of carriages	8
Passenger numbers per carriage	55
Number of trips	10
Average price per passenger (\$)	12
Annual days travelling	340

*CA Calculation**Year to 31 December*

	31/12/05	31/12/06	31/12/07	31/12/08	31/12/09	Total allowances
	(\$000 s)	(\$000 s)	(\$000 s)	(\$000 s)	(\$000 s)	(\$000 s)
TWDV	5,000	3,750	2,812	2,109	1,582	
WDA	1,250	938	703	527		
Sale proceeds					500	
Balancing allowance					1,082	
Tax Allowance	375	281	211	158	325	1,350
Capital projections						
Initial investment and proceeds	(5,000)				500	
Capital allowances	375	281	211	158	325	
Net capital flows	(4,625)	281	211	158	825	
Discount factor	1	0.909	0.826	0.751	0.683	
PV capital flows	(4,625)	256	174	119	563	
NPV of capital flows	(3,513)					

Projected revenue = $0.6 \times 8 \times 55 \times 10 \times 12 \times 340 = \$10,771,200$

Annuity approach

Year	0	1-5
Projected revenue		10,771
Variable costs		(7,001)
Additional fixed costs		(1,000)
Incremental net revenues		2,770
Tax		(831)
Post tax		1,939
Discount factor		3.791
PV revenue flows		7,351
NPV of revenue flows except perpetuity	7,351	
Perpetuity of lost flows net of tax	(1,750) ¹	
NPV of capital flows	(3,513)	
Total NPV	2,088	

Decision: Contract is worthwhile

Subject to rounding errors the extended approach produces the same answer.

¹ Perpetuity = $(250 \times (1 - 0.3)) / 0.1 = 1,750$



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Basic approach

Year	31/12/05	31/12/06	31/12/07	31/12/08	31/12/09	31/12/10
Net operating cash flow projections						
Projected revenue		10,771	10,771	10,771	10,771	10,771
Variable costs		(7,001)	(7,001)	(7,001)	(7,001)	(7,001)
Additional fixed costs		(1,000)	(1,000)	(1,000)	(1,000)	(1,000)
Incremental net revenues		2,770	2,770	2,770	2,770	2,770
Tax		(831)	831	(831)	(831)	(831)
Post tax revenues		1,939	1,939	1,939	1,939	1,939
Discount factor		0.909	0.826	0.751	0.683	0.621
PV revenue flows		1,763	1,602	1,456	1,324	1,204
NPV of net operating flows	7,349					
except perpetuity						
Perpetuity of lost flows net of tax	(1,750)					
Capital projections	(3,513)					
(See calculation above)						
Total NPV	2,086					
Decision: Contract is worthwhile						

- (b) It is quite possible to answer this and the next question by trial and error using the cash flow structures outlined. A quicker method is to use the structure of the cash flows to identify the relationship of price to the remaining variables. Thus, if:

- p = average price
 cr = contribution rate = 0.35
 oh = incremental overhead = 1000
 t = corporation tax rate = 0.3
 A_n = annuity factor
 r = occupancy rate

Total revenue = p × occupancy rate × number of carriages × number of trips per day × number of days per year × number of passengers per carriage = p × 0.6 × 8 × 10 × 340 × 55 = 897.6p. Thus, profit can be defined as:

$$NPV = A_n [(897.6p \times cr - oh)(1 - t)] + \text{Perpetuity} + NPV \text{ capital flows} = 0, \text{ for break even.}$$

$$NPV = 3.791[897.6p \times 0.35 - 1,000]0.7 - 1,750 - 3,513 = 0$$

$$897.6p \times 0.35 - 1,000 = 5,263 / (0.7 \times 3.791) = 1,983$$

$$p = (1,983 + 1,000) / (0.35 \times 897.6) = 9.50$$

$$\text{Sensitivity is therefore: } (12 - 9.50) / 12 = 20.83\%$$

More succinctly, the same result can be derived via interpolation. A 10% change in contribution gives rise to a change in NPV of:

$$(10,771 - 7,001) \times 0.1 \times 0.7 \times 3.791 = \$1,000,444, \text{ or } \$1,000 \text{ to the nearest thousand.}$$

To reduce NPV of the project to zero requires a $(2,087/1,000) \times 10\% = 2 \times 10\% = 20\%$ (approximate) change in price.

- (c) (i) As before, total revenue = p × occupancy rate × number of carriages × number of trips per day × number of days per year × number of passengers per carriage = 12 × r × 8 × 10 × 340 × 55 = 17,952r. Thus, profit can be defined as:

$$NPV = A_n [(17,952r \times cr - oh)(1 - t)] + \text{Perpetuity} + NPV \text{ capital flows} = 0, \text{ for break even.}$$

$$NPV = 3.791[17,952r \times 0.35 - 1,000]0.7 - 1,750 - 9,220 = 0$$

$$3.791[17,952r \times 0.35 - 1,000]0.7 = 10,970$$

$$17,952r \times 0.35 - 1,000 = 10,970 / (0.7 \times 3.791)$$

$$r = (4,134 + 1,000) / (0.35 \times 17,952) = 0.817 \text{ or } 82\%.$$

- (ii) Profit can be defined as before:



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$NPV = A_n [(10,771 \times cr - oh)(1 - t)] + \text{Perpetuity} + NPV \text{ capital flows} = 0$, for break even.

This time we can solve for A_n to find the length of the contract:

$$A_n [1,939] - 1,750 - 9,220 = 0$$

$$A_n [1,939] = 10,970$$

$$A_n = 10,970 / 1,939 = 5.658$$

Examining the annuity tables under the 10% column for a figure closest to 5.658 we find that project length, expressed in whole years, should be at least 9 years long (at 9 years the annuity figure is 5.759).

(d) Report on Business Risk for Glitter Railways plc

Author: XYZ

Date: December 2005

Introduction

In the light of the possibility of an extension to the contract to service the main railway line this report makes an assessment of the background and specific risk relating to the project.

What is meant by business risk

1. **Basic description:** risk is related to the lack of certainty of future outcomes and is fundamentally related to decision making, such as the project proposed, in that business decisions are always taken against a background of risk. Because of that, it becomes important to understand the risk exposure that exists. At a basic level risk is positively associated with return in that the higher the return we expect from a project, the higher the degree of risk it is likely to be exposed to.
2. **Chance and Probability:** risk is associated with chance or probability in ways that allow us to quantify the degree of risk we face. This is particularly relevant to businesses that face variability in projected outcomes, for example, so that a fairly clear idea can be formed of the profit impact of risk. In the contract extension facing Glitter Railways, project outcome has been assessed using NPV techniques that assume cash flows are certain (without risk). However, the cash flows are dependent on projections of future passenger occupancy, prices charged, implicit zero inflation, the relation of variable costs to sales, discount rates, constant tax rates and so on. In fact, every component of the calculation is subject to risk because we cannot be certain of ensuring that the figures we use will actually arise when the time comes or even at the time we project. Under such circumstances, we can only estimate the most likely figures and the most likely times and accept that we may be wrong on either or both counts.
3. **Time:** risk is also related to the length of time the projections extend. There is an important distinction at this point between constant risk and increased exposure. For example, we may assume that passenger occupancy stays constant at 60% and we may feel that there is a risk associated with being wrong in this projection by a factor of -1% or +1% each year. Whilst risk might remain constant at $\pm 1\%$ each year, it is feasible that after five years projected passenger occupancy could be less than 55% or over 65%. Compounding effects of risk on risk over successive periods means that risk exposure grows without having to alter the risk percentage faced.
4. **Negative and Positive Variability:** another important point relates to risk being both a good or bad thing. Risk, in the context of NPV projections, relates to variability of returns, both positive and negative. Thus, whilst you may not welcome negative variability in income, you would welcome it in relation to costs. Thus risk is not only related to unwelcome outcomes, although it is often misperceived as such.
5. **Uncertainty:** risk can also arise but may be unforeseen. This is perhaps the most important aspect in that, whilst we may be able to anticipate variability in incomes, we may not anticipate fully the risk we are exposed to or the form it will take (variability in sales revenues may be more than we anticipate, for example). This is the hardest aspect of risk to judge.

Methods of estimating the degree of business risk₂

Because risk affects decisions in such a fundamental way, businesses attempt to estimate risk as a way of putting in place contingency plans and/or evaluating if the project is likely to produce a profitable outcome. This is usually incorporated into NPV decisions in a number of ways:

1. **Sensitivity Analysis:** this is one method which is widely used by which an assessment may be made of how responsive a project's NPV is to changes in its components. Thus, an idea may be gained of to what extent prices charged for a good or service have to reduce by before a zero NPV is produced. This technique can be applied to any cost, including initial capital costs, and also to the discount rate. Sensitivity is normally expressed as a percentage. Some of the difficulties associated with the technique are as follows:

» the analysis can only deal with changes in one key factor at a time. It cannot deal with multiple



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changes in NPV components which may well arise.

- » no idea is given in sensitivity analysis of the likelihood of occurrence of a key variable changing to the extent to produce a zero NPV. In other words, it measures the percentage change required to produce a catastrophic result but does not indicate if this has a low, medium or high chance of occurring.
 - » as with any risk assessment, sensitivity analysis is only a guide. It cannot tell managers how important such a risk exposure is to the company. In order to assess this, the risk proclivity or otherwise, of the managers needs to be determined. In other words, a high return/high risk company will want to be exposed to more risk than a low return/ low risk company.
2. Probability analysis: this approach attempts to use measures which indicate just how variable cash flows are. It addresses one of the key criticisms of the sensitivity approach in that it provides an idea of how much variability is likely whereas sensitivity analysis indicates the room for manoeuvre without an assessment of the likelihood that any such event will arise. Probability analysis is essentially a weighted average approach where the averages are determined by pre-set probabilities. By doing this, expected cash flows emerge based on the most likely outcomes. The degree of variability of the expected outcomes may be estimated from the standard deviation of the net present value. It is in this calculation that we at least get some idea of the degree of risk a project is exposed to, which can be expressed in terms of a range of NPVs. The important drawback of this approach is that a good idea of what probability weights to use must first be established. This can never be determined with 100% accuracy for project cash flows that arise in the future simply because the future is uncertain and so are the probabilities.
 3. Decision trees: this is similar to a probability approach in that it relies on weighting future cash flows by probabilities to arrive at an overall average. The distinctive feature of decision trees is that certain cash flow outcomes can be made contingent on certain previous ones arising. Decision trees are most useful in expressing, in a systematic manner, the different project outcomes that may emerge. Formally, the technique is no different to that of using compound probabilities and hence the criticisms of probabilities apply here also.
 4. Simulation models: this method allows management to vary changes in the different cash flows simultaneously. As such it gives an idea of the variability in project cash flows overall by allowing changes in many of the outcomes. It can only give an idea since the number of changes allowed can be quite large and, when compounded together, the number of different combinations becomes unmanageable in terms of trying to interpret what is going on. The key advantage of this technique is that it allows an idea of the most likely range of project outcomes that could possibly emerge. However, the technique requires many computations to be carried out.

Methods of reducing business risk

Risk can only be reduced to the extent that management can control events. Risk associated with uncontrollable events cannot be manipulated. There are a variety of ways that management can respond to risky situations:

- ◆ undertake short payback projects. This is related to the fact that risk exposure increases with time because of its compounding effect even though the degree of risk may remain constant (this point is explained above).
- ◆ avoid risky projects. If riskless projects are undertaken then only a risk free return could be expected. This may not satisfy shareholders.
- ◆ ensure proper evaluations of risk are undertaken so that unnecessary exposure to risk is avoided.
- ◆ employ risk avoidance project selection strategies. Management should not undertake high risk projects simultaneously which might produce undesirable risk exposure to the business as a whole.
- ◆ combine projects to diversify risk.



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11 Orange

- (a) Why convertibles might be an attractive source of finance for companies
1. Convertibles can provide immediate finance at lower cost since the conversion option effectively reduces the interest rates payable.
 2. They represent attractive investments to investors since they are effectively debt risks for future equity benefits. Hence, finance is relatively easily raised.
 3. Should the company's assumption regarding the likelihood of conversion prove true then there is no problem of establishing a large sinking fund for the redemption of the debentures.
 4. Convertibles allow for higher gearing levels than would otherwise be the case with straight debt (interest costs are potentially lower with convertibles).

- (b) (i) Calculate PV of cash flows

	<i>Interest (8%)</i>	<i>PV at 15%</i>
1	8	6.95
2	8	6.05
3	8	5.26
4	8	4.57
5	8	3.97
5 (Conversion): $4 \times 45 \times 0.497$		89.46
Estimated market value:		\$116.26 per \$100 of debentures

The value of 45 shares in 5 years' time is expected to be $\$4 \times 45 = \180 . The value of debenture redemption will be \$110. Hence it is likely that conversion will take place. (ii) Arguably, the most important reservation concerns the future value of the share since it is likely to be the most uncertain aspect of the calculation. Other factors that may be relevant, but which are less uncertain, are issue price, and the cost of capital used.

- (c) By maximising the conversion premium the greatest amount of funds are raised for the fewest number of new shares issued.

Companies can issue convertibles with a high conversion premium because, firstly, the calculation in part (a)i produces a positive NPV against issue costs and, secondly, because there is high growth potential in share value.

- (d) Financial intermediation refers to the role of a bank or other financial institution that serves to bring together lenders and borrowers. Investors are seeking avenues to place surplus funds whilst companies are seeking sources of finance. Because of the disparate nature of both investors and companies it is difficult to match investors to a company where the requirements of the investor are met and the needs of the company are satisfied. Thus, banks (as an example) act as a conduit through which investors can place funds and companies can borrow funds. In return, investors obtain interest on their deposits and the banks obtain interest on their loans. Clearly, the interest charged by the bank to the company is higher than it pays out to investors.

The role that financial intermediaries perform is to pool together investor funds to facilitate easy access by companies. Without financial intermediaries, companies would almost certainly face capital shortages.

The benefits of financial intermediation are as follows:

1. Investors can pool their funds in a bank deposit account to facilitate access by companies to larger resources than would otherwise be the case. This enables companies to:
 - (a) Exploit investment opportunities that would otherwise be untapped.
 - (b) Become larger than would otherwise be the case and thus take advantage of economies of scale.
 - (c) Find capital readily and easily thus reducing the costs associated with raising funds.
 - (d) Reduce the cost of finance since:
 - (i) banks can, with their greater financial expertise, more accurately assess the risk of corporate investments.
 - (ii) banks can diversify their risk across many companies thus lowering their required rate of return which, in turn, reduces the cost base on which interest charges to companies will be referenced.
 - (iii) banks can reduce interest costs because of their size. They are able to borrow on the wholesale market at rates that are not accessible to small banks or individual investors.



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- (e) Bridge the maturity gap. Banks can lend longer term than individual investors desire since banks will have access to a level of funds that is largely constant irrespective of a high turnover of constituent investors.
- (f) Access finance for high risk projects that banks may find acceptable because of their capacity to diversify.
2. Investors benefit substantially from financial intermediation because:
- (a) By investing in a market or bank, investors can get access to diversified portfolios which might otherwise be difficult. Since their funds are pooled, investors benefit from the banks' abilities to aggregate funds and allocate them efficiently.
- (b) Investors can access bank expertise in assessing corporate risk, thus obtaining the best return for a particular level of risk.
- (c) Investor risk is reduced because of the banks' diversifying activities. Minimised risk, subject to a required rate of return, is passed onto investors in a competitive banking market.
- (d) Legislation that provides for investor protection should a bank fail (in terms of either central bank support or investor guarantee schemes by other banks), further reduces the risk investors face.
- (e) Investors can choose their exposure to a particular level of risk subject to depositing money in appropriate funds. For example, mutual funds offer a range of risk profiles from which the investor can choose.

12 Blue

- (a) Blue plc

$$K_e = \frac{0.024}{0.30 - 0.024} = 8.7\%$$

- (b) Red plc

Growth rate, g:

$$(1+g)^4 = \frac{25}{15} = 1.667 \therefore g = 13.62\%$$

$$K_e = \frac{0.25 \times 1.1362}{3} + 0.1362 = 23.1\%$$

- (c) White plc

$$K_e = \frac{0.14 \times 1.06}{1.40} + 0.06 = 16.6\%$$

$$E = 400,000 \times 1.40 = \$560,000$$

 K_d :

Time	\$	10%	PV	20%	PV
0	(78)	1	(78)	1	(78)
1-6	12	4.355	52.26	3.326	39.91
6	105	0.564	59.22	0.335	35.18
			<u>33.48</u>		<u>(2.91)</u>

$$\therefore K_d = 10 + \left(10 \times \frac{33.48}{33.48 + 2.91} \right) = 19.2\%$$

$$D = 600,000 \times .78 = \$468,000$$

$$\therefore WACC = \frac{(560,000 \times 16.6) + (468,000 \times 19.2)}{1,028,000} = 17.8\%$$



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(d) Yellow plc

$$K_d = \frac{15}{130-15} = 13.04\%$$

$$E = 1 \text{ million} \times 1.15 = \$1.15 \text{ million}$$

 K_d :

Time	\$	10%	PV	5%	PV
0	(90)	1	(90)	1	(90)
1-5	3.25	3.791	12.32	4.329	14.07
5	100	0.621	<u>62.10</u>	<u>.784</u>	<u>78.80</u>
			<u>(15.58)</u>		<u>2.47</u>

$$K_d = 5 + \left(5 \times \frac{2.47}{18.05} \right) = 5.68\%$$

$$D = 500,000 \times .90 = \$450,000$$

$$WACC = \frac{(1,150,000 \times 13.04) + (450,000 \times 5.08)}{1,600,000} = 10.97\%$$

13 XYZ

(a) WACC

$$K_e = 15/130 = 11.5\%$$

$$K_d \text{ (after tax)} = 9 \times (1-0.35)/95 = 6.2\%$$

$$E = 100,000 \times 1.30 = \$130,000$$

$$D = 95\% \times 80,000 = \$76,000$$

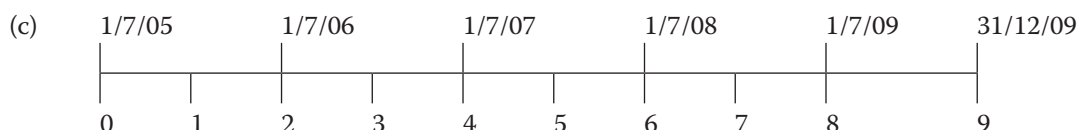
$$WACC = 11.5\% \times \frac{130}{(130+76)} + 6.2\% \times \frac{76}{(130+76)} = 9.5\%$$

(b) Internal Rate of Return to company per period

Time	\$	DF@ 10%	PV \$	DF@ 15%	PV \$
0	(75)	1	(75)	1	(75)
1-5	9(1-0.35)	3.791	22.18	3.352	19.61
5	110	<u>0.621</u>	68.31	<u>0.497</u>	54.67
			<u>15.49</u>		<u>(0.72)</u>

Using linear interpolation

$$IRR + 10\% + \left(\frac{15.49}{15.49 + 0.72} \right) \times 5\% = \text{approx. } 14.78\%$$



Internal Rate of Return to investors

Time	\$	DF@ 5%	PV \$	DF@0%	PV \$
0	(97)	1	(97)	1	(97)
1-9	4(1-0.35)	7.108	18.48	9	23.40
9	100	0.645	<u>64.50</u>	1	<u>100</u>
			<u>(14.02)</u>		<u>26.40</u>



Using linear interpolation

PRACTICE ANSWERS

$$\text{IRR} = 0\% + \left(\frac{26.40}{14.02 + 26.40} \right) \times 5\% = \text{approx. } 3.3\%$$

This is equivalent to $R = (1+r)^n - 1 = (1+0.033)^2 = \text{approx. } 6.7\%$ per annum

14 Little plc

- (a) Techniques for protecting against the risk of adverse foreign exchange movements include the following.
- A company could trade only in its own currency, thus transferring all risks to suppliers and customers.
 - A company could ensure that its assets and liabilities in any one currency are as nearly equal as possible, so that losses on assets (or liabilities) are matched by gains on liabilities (or assets).
 - A company could enter into forward contracts, under which an agreed amount of a currency will be bought or sold at an agreed rate at some fixed future date or, under a forward option contract, at some date in a fixed future period.
 - A company could buy foreign currency options, under which the buyer acquires the right to buy (call options) or sell (put options) a certain amount of a currency at a fixed rate at some future date. If rates move in such a way that the option rate is unfavourable, the option is simply allowed to lapse.
 - A company could buy foreign currency futures on a financial futures exchange. Futures are effectively forward contracts, in standard sizes and with fixed maturity dates. Their prices move in response to exchange rate movements, and they are usually sold before maturity, the profit or loss on sale corresponding approximately to the exchange loss or profit on the currency transaction they were intended to hedge.
 - A company could enter into a money market hedge. One currency is borrowed and converted into another, which is then invested until the funds are required or funds are received to repay the original loan. The early conversion protects against adverse exchange rate movements, but at a cost equal to the difference between the cost of borrowing in one currency and the return available on investment in the other currency.

- (b) (i) 1 Forward exchange market
The rates are:

	\$/£
Spot	1.7106 – 1.7140
3 months forward	1.7024 – 1.7063
6 months forward	1.6967 – 1.7006

The net receipt three months hence is $(\$197,000 - \$116,000)/1.7063 = £47,471$.

The net payment six months hence is $(\$447,000 - \$154,000)/1.6967 = £172,688$.

Note that the dollar receipts can be used in part settlement of the dollar payments, so only the net payment is hedged.

- 2 Money market

A net of \$81,000 ($\$197,000 - \$116,000$) will be received three months hence, so $\$81,000 / (1 + 0.09 \times \frac{3}{12})$ may be borrowed now and converted into sterling, the dollar loan to be repaid from the receipts.

The net sterling payment three months hence is

$$\frac{\$81,000}{1 + (0.09 \times \frac{3}{12})} \times \frac{1}{1.7140} \times \left(1 + (0.095 \times \frac{3}{12}) \right) = £47,316$$

The equation for the \$197,000 receipt in three months is to calculate the amount of dollars to borrow now (divide by the dollar borrowing rate) and then to find out how much that will give now in sterling (divide by the exchange rate). The final amount of sterling after three months is given by multiplying by the sterling lending rate.

\$293,000 (net) must be paid six months hence. We can borrow sterling now and convert it into dollars, such that the fund in six months will equal \$293,000. The sterling payment in six months time will be the principal and the interest thereon. A similar logic applies as for the equation above except that the situation is one of making a final payment rather than a receipt.

The sterling payment six months hence is therefore

$$\frac{293,000}{1 + 0.06 \times \frac{6}{12}} \times \frac{1}{1.7106} \times \left(1 + 0.125 \times \frac{6}{12} \right) = £176,690$$

- (ii) Available put options (put, because sterling is to be sold) are at \$1.70 (cost 3.45 cents per \$) and at \$1.80 (cost 9.32 cents per \$).



PRACTICE ANSWERS

Using options at \$1.70 gives the following results.

$$\frac{\$293,000}{1.70\$/\pounds} = \pounds 172,353$$

$$\text{Contracts required} = \frac{\pounds 172,353}{\pounds 12,500} = 14 \text{ (to the next whole number)}$$

$$\text{Cost of options} = 14 \times 12,500 \times 3.45 \text{ cents} = \$6,038.$$

$$14 \text{ contracts will provide, for } \pounds 12,500 \times 14 = \pounds 175,000, \$ (175,000 \times 1.70) = \$297,500$$

$$\text{The overall cost is } \pounds 175,000 + \frac{\$293,000 + \$6,038 - \$297,500}{1.6967} = \pounds 175,906$$

As this figure exceeds the cost of hedging through the forward exchange market (\$172,688), use of \$1.70 options would have been disadvantageous.

Note. The rate of 1.6967 is used instead of 1.7006 because buying 14 contracts leaves the company slightly short of dollars (by \$293,000 + \$6,038 - \$297,500 = \$1,538).

Using options at \$1.80:

$$\frac{\$293,000}{1.80\$/\pounds} = \pounds 162,778$$

$$\text{Contracts required} = \frac{\pounds 162,778}{\pounds 12,500} = 14 \text{ (to next whole number)}$$

$$\text{Cost of options} = 14 \times 12,500 \times 9.32 \text{ cents} = \$16,310$$

$$14 \text{ contracts will provide, for } \pounds 12,500 \times 14 = \pounds 175,000, 175,000 \times 1.80 = \$315,000$$

$$\text{The overall cost is } \pounds 175,000 + \frac{\$293,000 + \$16,310 - \$315,000}{1.7006} = \pounds 171,654$$

This figure is less than the cost of hedging through the forward exchange market, so use of \$1.80 options would have been preferable.

15 Banks

- (a) According to the International Fisher Effect (IFE) interest rate differentials between any two countries provide an unbiased predictor of future changes in the spot rate of exchange.

If interest rates are 6% in the UK, and 8.5% in the USA the expected annual change in spot exchange rates is:

$$\frac{0.085 - 0.06}{1.06} = 2.358\% \text{ with the dollar WEAKENING against pound}$$

The expected exchange rate in two years time is $\$1.5240 (1.02358)^2 = \$1.5967/\pounds$

The non-executive director has based her estimate on the International Fisher Effect, and has correctly calculated the expected change in exchange rates.

However, this does NOT mean that the exchange rate in two years time will be \$1.5967/\$ Reasons for this rate:

- (i) The interest rate differential may change during the next two years
 - (ii) Even if the interest differential remains constant the IFE is an unbiased, not accurate, predictor of future exchange rates.
 - (iii) Exchange rates may not be in equilibrium at the current time. The IFE predicts movements from an equilibrium position.
 - (iv) Factors other than interest rates influence exchange rates, including government intervention in foreign exchange markets.
- (b) The most likely reason for the differences in the forecasts of the banks is that they have based their forecasts on different economic assumptions and/or used different types of forecasting model.

Different assumptions about inflation rates, interest rates, unemployment levels, balance of payments, economic growth, which political party will be in power etc. will lead to wide variations in forecasts.

Forecasts may be based on purchasing power parity, IFE or other elements of the four way equivalence model, on macro-economic factors such as flow of funds and the balance of payments, on charting exchange rate trends in order to spot patterns of future exchange rate movements, on econometric modelling, or a combination of such methods. Each of these forecasting methods is likely to produce different results.

