
Answers

1 (a) Calculation of weighted average cost of capital (WACC)

Cost of equity

Cost of equity using capital asset pricing model = $4.7 + (1.2 \times 6.5) = 12.5\%$

Cost of convertible debt

Annual after-tax interest payment = $7 \times (1 - 0.3) = \$4.90$ per bond

Share price in six years' time = $5.50 \times 1.06^6 = \$7.80$

Conversion value = $7.80 \times 15 = \$117.00$ per bond

Conversion appears likely, since the conversion value is much greater than par value.

The future cash flows to be discounted are therefore six years of after-tax interest payments and the conversion value received in year 6:

Year	Cash flow	\$	10% DF	PV (\$)	5% DF	PV (\$)
0	market value	(107.11)	1.000	(107.11)	1.000	(107.11)
1–6	interest	4.9	4.355	21.34	5.076	24.87
6	conversion	117.00	0.564	66.00	0.746	87.28
				(19.77)		5.04

Using linear interpolation, after-tax cost of debt = $5 + [(5 \times 5.04)/(5.04 + 19.77)] = 6.0\%$.

(Note that other after-tax costs of debt will arise if different discount rates are used in the linear interpolation calculation.)

We can confirm that conversion is likely and implied by the current market price of \$107.11 by noting that the floor value of the convertible debt at an after-tax cost of debt of 6% is \$93.13 ($4.9 \times 6.210 + 100 \times 0.627$).

Cost of bank loan

After-tax interest rate = $8 \times (1 - 0.3) = 5.6\%$

This can be used as the cost of debt for the bank loan.

An alternative would be to use the after-tax cost of debt of ordinary (e.g. not convertible) traded debt, but that is not available here.

Market values

Market value of equity = $20m \times 5.50 = \$110$ million

Market value of convertible debt = $29m \times 107.11/100 = \31.06 million

Book value of bank loan = \$2m

Total market value = $110 + 31.06 + 2 = \$143.06$ million

WACC = $[(12.5 \times 110) + (6.0 \times 31.06) + (5.6 \times 2)]/143.06 = 11.0\%$

- (b)** The weighted average cost of capital (WACC) can be used as a discount rate in investment appraisal provided that the risks of the investment project being evaluated are similar to the current risks of the investing company. The WACC would then reflect these risks and represent the average return required as compensation for these risks.

WACC can be used in investment appraisal provided that the business risk of the proposed investment is similar to the business risk of existing operations. Essentially this means that WACC can be used to evaluate an expansion of existing business. If the business risk of the investment project is different from the business risk of existing operations, a project-specific discount rate that reflects the business risk of the investment project should be considered. The capital asset pricing model (CAPM) can be used to derive such a project-specific discount rate.

WACC can be used in investment appraisal provided that the financial risk of the proposed investment is similar to the financial risk of existing operations. This means that financing for the project should be raised in proportions that broadly preserve the capital structure of the investing company. If this is not the case, an investment appraisal method called adjusted present value (APV) should be used. Alternatively, the CAPM-derived project-specific cost of capital can be adjusted to reflect the financial risk of the project financing.

A third constraint on using WACC in investment appraisal is that the proposed investment should be small in comparison with the size of the company. If this were not the case, the scale of the investment project could cause a change to occur in the perceived risk of the investing company, making the existing WACC an inappropriate discount rate.

- (c)** The dividend growth model has several difficulties attendant on its use as a way of estimating the cost of equity. For example, the model assumes that the future dividend growth rate is constant in perpetuity, an assumption that is not supported by the way that dividends change in practice. Each dividend paid by a company is the result of a dividend decision by managers, who will consider, but not be bound by, the dividends paid in previous periods. Estimating the future dividend growth rate is also very difficult. Historical dividend trends are usually analysed and on the somewhat risky assumption that the future will repeat the past, the historic dividend growth rate is used as a substitute for the future dividend growth rate. The model also assumes that business risk, and hence business operations and the cost of equity, are constant in future periods, but reality shows us that companies, their business operations and their economic environment are subject to constant change. Perhaps the one certain thing about the future is its uncertainty.

It is sometimes said that the dividend growth model does not consider risk, but risk is implicit in the share price used by the model to calculate the cost of equity. A moment's thought will indicate that share prices fall as risk increases, indicating that increasing risk will lead to an increasing cost of equity. What is certainly true is that the dividend growth model does not consider risk explicitly in the same way as the capital asset pricing model (CAPM). Here, all investors are assumed to hold diversified portfolios and as a result only seek compensation (return) for the systematic risk of an investment. The CAPM represent the required rate of return (i.e. the cost of equity) as the sum of the risk-free rate of return and a risk premium reflecting the systematic risk of an individual company relative to the systematic risk of the stock market as a whole. This risk premium is the product of the company's equity beta and the equity risk premium. The CAPM therefore tells us what the cost of equity should be, given an individual company's level of systematic risk.

The individual components of the CAPM (the risk-free rate of return, the equity risk premium and the equity beta) are found by empirical research and so the CAPM gives rise to a much smaller degree of uncertainty than that attached to the future dividend growth rate in the dividend growth model. For this reason, it is usually suggested that the CAPM offers a better estimate of the cost of equity than the dividend growth model.

2 (a) Calculation of share price

THP Co dividend per share = $64 \times 0.5 = 32$ c per share

Share price of THP Co = $(32 \times 1.05)/(0.12 - 0.05) = \4.80

Market capitalisation of THP Co = $4.80 \times 3\text{m} = \14.4m

(b) Rights issue price

This is at a 20% discount to the current share price = $4.80 \times 0.8 = \$3.84$ per share

New shares issued = $3\text{m}/3 = 1\text{m}$

Cash raised = $1\text{m} \times 3.84 = \$3,840,000$

Theoretical ex rights price = $[(3 \times 4.80) + 3.84]/4 = \4.56 per share

Market capitalisation after rights issue = $14.4\text{m} + 3.84\text{m} = \$18.24 - 0.32\text{m} = \$17.92\text{m}$

This is equivalent to a share price of $17.92/4 = \$4.48$ per share

The issue costs result in a decrease in the market value of the company and therefore a decrease in the wealth of shareholders equivalent to 8c per share.

(c) Price/earnings ratio valuation

Price/earnings ratio of THP Co = $480/64 = 7.5$

Earnings per share of CRX Co = 44.8c per share

Using the price earnings ratio method, share price of CRX Co = $(44.8 \times 7.5)/100 = \3.36

Market capitalisation of CRX Co = $3.36 \times 1\text{m} = \$3,360,000$

(Alternatively, earnings of CRX Co = $1\text{m} \times 0.448 = \$448,000 \times 7.5 = \$3,360,000$)

(d) In a semi-strong form efficient capital market, share prices reflect past and public information. If the expected annual after-tax savings are not announced, this information will not therefore be reflected in the share price of THP Co. In this case, the post acquisition market capitalisation of THP Co will be the market capitalisation after the rights issue, plus the market capitalisation of the acquired company (CRX Co), less the price paid for the shares of CRX Co, since this cash has left the company in exchange for purchased shares. It is assumed that the market capitalisations calculated in earlier parts of this question are fair values, including the value of CRX Co calculated by the price/earnings ratio method.

Price paid for CRX Co = $3.84\text{m} - 0.32\text{m} = \3.52m

Market capitalisation = $17.92\text{m} + 3.36\text{m} - 3.52\text{m} = \17.76m

This is equivalent to a share price of $17.76/4 = \$4.44$ per share

The market capitalisation has decreased from the value following the rights issue because THP Co has paid \$3.52m for a company apparently worth \$3.36m. This is a further decrease in the wealth of shareholders, following on from the issue costs of the rights issue.

If the annual after-tax savings are announced, this information will be reflected quickly and accurately in the share price of THP Co since the capital market is semi-strong form efficient. The savings can be valued using the price/earnings ratio method as having a present value of \$720,000 ($7.5 \times 96,000$). The revised market capitalisation of THP Co is therefore \$18.48m ($17.76\text{m} + 0.72\text{m}$), equivalent to a share price of \$4.62 per share ($18.48/4$). This makes the acquisition of CRX Co attractive to the shareholders of THP Co, since it offers a higher market capitalisation than the one following the rights issue. Each shareholder of THP Co would experience a capital gain of 14c per share ($4.62 - 4.48$).

In practice, the capital market is likely to anticipate the annual after-tax savings before they are announced by THP Co.

(e) There are a number of factors that should be considered by THP Co, including the following.

Gearing and financial risk

Equity finance will decrease gearing and financial risk, while debt finance will increase them. Gearing for THP Co is currently 68.5% and this will decrease to 45% if equity finance is used, or rise to 121% if debt finance is used. There may also be

some acquired debt finance in the capital structure of CRX Co. THP Co needs to consider what level of financial risk is desirable, from both a corporate and a stakeholder perspective.

Target capital structure

THP Co needs to compare its capital structure after the acquisition with its target capital structure. If its primary financial objective is to maximise the wealth of shareholders, it should seek to minimise its weighted average cost of capital (WACC). In practical terms this can be achieved by having some debt in its capital structure, since debt is relatively cheaper than equity, while avoiding the extremes of too little gearing (WACC can be decreased further) or too much gearing (the company suffers from the costs of financial distress).

Availability of security

Debt will usually need to be secured on assets by either a fixed charge (on specific assets) or a floating charge (on a specified class of assets). The amount of finance needed to buy CRX CO would need to be secured by a fixed charge to specific fixed assets of THP Co. Information on these fixed assets and on the secured status of the existing 8% loan notes has not been provided.

Economic expectations

If THP Co expects buoyant economic conditions and increasing profitability in the future, it will be more prepared to take on fixed interest debt commitments than if it believes difficult trading conditions lie ahead.

Control issues

A rights issue will not dilute existing patterns of ownership and control, unlike an issue of shares to new investors. The choice between offering new shares to existing shareholders and to new shareholders will depend in part on the amount of finance that is needed, with rights issues being used for medium-sized issues and issues to new shareholders being used for large issues. Issuing traded debt also has control implications however, since restrictive or negative covenants are usually written into the bond issue documents.

Workings

Current gearing (debt/equity, book value basis) = $100 \times 5,000 / 7,300 = 68.5\%$

Gearing if equity finance is used = $100 \times 5,000 / (7,300 + 3,840) = 45\%$

Gearing if debt finance is used = $100 \times (5,000 + 3,840) / 7,300 = 121\%$

- 3 (a)** There are a number of factors that determine the level of investment in current assets and their relative importance varies from company to company.

Length of working capital cycle

The working capital cycle or operating cycle is the period of time between when a company settles its accounts payable and when it receives cash from its accounts receivable. Operating activities during this period need to be financed and as the operating period lengthens, the amount of finance needed increases. Companies with comparatively longer operating cycles than others in the same industry sector, will therefore require comparatively higher levels of investment in current assets.

Terms of trade

These determine the period of credit extended to customers, any discounts offered for early settlement or bulk purchases, and any penalties for late payment. A company whose terms of trade are more generous than another company in the same industry sector will therefore need a comparatively higher investment in current assets.

Policy on level of investment in current assets

Even within the same industry sector, companies will have different policies regarding the level of investment in current assets, depending on their attitude to risk. A company with a comparatively conservative approach to the level of investment in current assets would maintain higher levels of inventory, offer more generous credit terms and have higher levels of cash in reserve than a company with a comparatively aggressive approach. While the more aggressive approach would be more profitable because of the lower level of investment in current assets, it would also be more risky, for example in terms of running out of inventory in periods of fluctuating demand, of failing to have the particular goods required by a customer, of failing to retain customers who migrate to more generous credit terms elsewhere, and of being less able to meet unexpected demands for payment.

Industry in which organisation operates

Another factor that influences the level of investment in current assets is the industry within which an organisation operates. Some industries, such as aircraft construction, will have long operating cycles due to the length of time needed to manufacture finished goods and so will have comparatively higher levels of investment in current assets than industries such as supermarket chains, where goods are bought in for resale with minimal additional processing and where many goods have short shelf-lives.

- (b)** Factoring involves a company turning over administration of its sales ledger to a factor, which is a financial institution with expertise in this area. The factor will assess the creditworthiness of new customers, record sales, send out statements and reminders, collect payment, identify late payers and chase them for settlement, and take appropriate legal action to recover debts where necessary.

The factor will also offer finance to a company based on invoices raised for goods sold or services provided. This is usually up to 80% of the face value of invoices raised. The finance is repaid from the settled invoices, with the balance being passed to the issuing company after deduction of a fee equivalent to an interest charge on cash advanced.

If factoring is without recourse, the factor rather than the company will carry the cost of any bad debts that arise on overdue accounts. Factoring without recourse therefore offers credit protection to the selling company, although the factor's fee (a percentage of credit sales) will be comparatively higher than with non-recourse factoring to reflect the cost of the insurance offered.

Invoice discounting is a way of raising finance against the security of invoices raised, rather than employing the credit management and administration services of a factor. A number of good quality invoices may be discounted, rather than all invoices, and the service is usually only offered to companies meeting a minimum turnover criterion.

(c) Calculation of size of overdraft

Inventory period = operating cycle + payables period – receivables period = 3 + 1 – 2 = 2 months

Inventory = $1.89m \times 2/12 = \$315,000$

Accounts receivable = $4.2m \times 2/12 = \$700,000$

Current assets = $315,000 + 700,000 = \$1,015,000$

Current liabilities = current assets/current ratio = $1,015,000/1.4 = \$725,000$

Accounts payable = $1.89m \times 1/12 = \$157,500$

Overdraft = $725,000 - 157,500 = \$567,500$

Net working capital = current assets – current liabilities = $1,015,000 - 725,000 = \$290,000$

Short-term financing cost = $567,500 \times 0.07 = \$39,725$

Long-term financing cost = $290,000 \times 0.11 = \$31,900$

Total cost of financing current assets = $39,725 + 31,900 = \$71,625$

(d) (i) Economic order quantity = $(2 \times 6 \times 60,000/0.5)^{0.5} = 1,200$ units

Number of orders = $60,000/1,200 = 50$ order per year

Annual ordering cost = $50 \times 6 = \$300$ per year

Average inventory = $1,200/2 = 600$ units

Annual holding cost = $600 \times 0.5 = \$300$ per year

Inventory cost = $60,000 \times 12 = \$720,000$

Total cost of inventory with EOQ policy = $720,000 + 300 + 300 = \$720,600$ per year

(ii) Order size for bulk discounts = 10,000 units

Number of orders = $60,000/10,000 = 6$ orders per year

Annual ordering cost = $6 \times 6 = \$36$ per year

Average inventory = $10,000/2 = 5,000$ units

Annual holding cost = $5,000 \times 2 = \$10,000$ per year

Discounted material cost = $12 \times 0.99 = \$11.88$ per unit

Inventory cost = $60,000 \times 11.88 = \$712,800$

Total cost of inventory with discount = $712,800 + 36 + 10,000 = \$722,836$ per year

The EOQ approach results in a slightly lower total inventory cost

4 (a) Calculation of net present value

Year	0	1	2	3	4
	\$	\$	\$	\$	\$
Sales revenue	728,000	1,146,390	1,687,500	842,400	
Variable costs	(441,000)	(701,190)	(1,041,750)	(524,880)	
Contribution	287,000	445,200	645,750	317,520	
Capital allowances	(250,000)	(250,000)	(250,000)	(250,000)	
Taxable profit	37,000	195,200	395,750	67,520	
Taxation	(11,100)	(58,560)	(118,725)	(20,256)	
After-tax profit	25,900	136,640	277,025	47,264	
Capital allowances	250,000	250,000	250,000	250,000	
After-tax cash flow	275,900	386,640	527,025	297,264	
Initial investment	(1,000,000)				
Working capital	(50,960)	(29,287)	(37,878)	59,157	58,968
Net cash flows	(1,050,960)	246,613	348,762	586,182	356,232
Discount at 12%	1.000	0.893	0.797	0.712	0.636
Present values	(1,050,960)	220,225	277,963	417,362	226,564

NPV = \$91,154

Workings

Sales revenue

Year	1	2	3	4
Selling price (\$/unit)	20·80	21·63	22·50	23·40
Sales volume (units)	35,000	53,000	75,000	36,000
Sales revenue (\$)	728,000	1,146,390	1,687,500	842,400

Variable costs

Year	1	2	3	4
Variable cost (\$/unit)	12·60	13·23	13·89	14·58
Sales volume (units)	35,000	53,000	75,000	36,000
Variable costs (\$)	441,000	701,190	1,041,750	524,880

Total investment in working capital

Year 0 investment = $728,000 \times 0\cdot07 = \$50,960$

Year 1 investment = $1,146,390 \times 0\cdot07 = \$80,247$

Year 2 investment = $1,687,500 \times 0\cdot07 = \$118,125$

Year 3 investment = $842,400 \times 0\cdot07 = \$58,968$

Incremental investment in working capital

Year 0 investment = $728,000 \times 0\cdot07 = \$50,960$

Year 1 investment = $80,247 - 50,960 = \$29,287$

Year 2 investment = $118,125 - 80,247 = \$37,878$

Year 3 recovery = $58,968 - 118,125 = \$59,157$

Year 4 recovery = \$58,968

(b) Calculation of internal rate of return

Year	0	1	2	3	4
	\$	\$	\$	\$	\$
Net cash flows	(1,050,960)	246,613	348,762	586,182	356,232
Discount at 20%	1·000	0·833	0·694	0·579	0·482
Present values	(1,050,960)	205,429	242,041	339,399	171,704

NPV at 20% = (\$92,387)

NPV at 12% = \$91,154

IRR = $12 + [(20 - 12) \times 91,154 / (91,154 + 92,387)] = 12 + 4 = 16\%$

(c) Acceptability of the proposed investment in Product P

The NPV is positive and so the proposed investment can be recommended on financial grounds.

The IRR is greater than the discount rate used by SC Co for investment appraisal purposes and so the proposed investment is financially acceptable. The cash flows of the proposed investment are conventional and so there is only one internal rate of return. Furthermore, only one proposed investment is being considered and so there is no conflict between the advice offered by the IRR and NPV investment appraisal methods.

Limitations of the investment evaluations

Both the NPV and IRR evaluations are heavily dependent on the production and sales volumes that have been forecast and so SC Co should investigate the key assumptions underlying these forecast volumes. It is difficult to forecast the length and features of a product's life cycle so there is likely to be a degree of uncertainty associated with the forecast sales volumes. Scenario analysis may be of assistance here in providing information on other possible outcomes to the proposed investment.

The inflation rates for selling price per unit and variable cost per unit have been assumed to be constant in future periods. In reality, interaction between a range of economic and other forces influencing selling price per unit and variable cost per unit will lead to unanticipated changes in both of these project variables. The assumption of constant inflation rates limits the accuracy of the investment evaluations and could be an important consideration if the investment were only marginally acceptable.

Since no increase in fixed costs is expected because SC Co has spare capacity in both space and labour terms, fixed costs are not relevant to the evaluation and have been omitted. No information has been offered on whether the spare capacity exists in future periods as well as in the current period. Since production of Product P is expected to more than double over three years, future capacity needs should be assessed before a decision is made to proceed, in order to determine whether any future incremental fixed costs may arise.

(d) The primary financial management objective of private sector companies is often stated to be the maximisation of the wealth of its shareholders. While other corporate objectives are also important, for example due to the existence of other corporate stakeholders than shareholders, financial management theory emphasises the importance of the objective of shareholder wealth maximisation.

Shareholder wealth increases through receiving dividends and through share prices increasing over time. Changes in share prices can therefore be used to assess whether a financial management decision is of benefit to shareholders. In fact, the objective of maximising the wealth of shareholders is usually substituted by the objective of maximising the share price of a company.

The net present value (NPV) investment appraisal method advises that an investment should be accepted if it has a positive NPV. If a company accepts an investment with a positive NPV, the market value of the company, theoretically at least, increases by the amount of the NPV. A company with a market value of \$10 million investing in a project with an NPV of \$1 million will have a market value of \$11 million once the investment is made. Shareholder wealth is therefore increased if positive NPV projects are accepted and, again theoretically, shareholder wealth will be maximised if a company invests in all projects with a positive NPV. This is sometimes referred to as the optimum investment schedule for a company.

The NPV investment appraisal method also contributes towards the objective of maximising the wealth of shareholders by using the cost of capital of a company as a discount rate when calculating the present values of future cash flows. A positive NPV represents an investment return that is greater than that required by a company's providers of finance, offering the possibility of increased dividends being paid to shareholders from future cash flows.

		<i>Marks</i>	<i>Marks</i>
1	(a) Calculation of cost of equity Calculation of cost of convertible debt Calculation of cost of bank loan Calculation of market values Calculation of WACC	2 5 1 2 2	<u> </u>
			12
	(b) Discussion of business risk Discussion of financial risk Discussion of other relevant factors	2-3 1-2 1-2	<u> </u>
			<u> </u>
		Maximum	6
	(c) Discussion of dividend growth model Discussion of capital asset pricing model Conclusion	2-3 2-3 1-2	<u> </u>
			<u> </u>
		Maximum	7
			<u> </u>
		25	
2	(a) Dividend per share Ex dividend share price Market capitalisation	1 2 1	<u> </u>
			4
	(b) Rights issue price Cash raised Theoretical ex rights price per share Market capitalisation	1 1 1 2	<u> </u>
			5
	(c) Calculation of price/earnings ratio Price/earnings ratio valuation	1 2	<u> </u>
			3
	(d) Calculations of market capitalisation Comment	2-3 3-4	<u> </u>
			5
	(e) Relevant discussion Links to scenario in question	6-7 2-3	<u> </u>
			8
		Maximum	<u> </u>
		25	

		<i>Marks</i>	<i>Marks</i>
		Maximum	6
3	(a) Discussion of key factors		
	(b) Discussion of factoring Discussion of Invoice discounting	4–5 1–2	
		<hr/>	<hr/>
		Maximum	6
	(c) Value of inventory	1	
	Accounts receivable and accounts payable	1	
	Current liabilities	1	
	Size of overdraft	1	
	Net working capital	1	
	Total cost of financing working capital	<hr/>	<hr/>
		1	6
	(d) (i) Economic order quantity	1	
	Ordering cost and holding cost under EOQ	1	
	Inventory cost under EOQ	1	
	Total cost of inventory with EOQ policy	<hr/>	<hr/>
		1	4
	(ii) Ordering cost and holding cost with discount	1	
	Inventory cost with discount	1	
	Total cost of inventory with bulk purchase discount	1	
	Conclusion	<hr/>	<hr/>
		1	3
		Maximum	<hr/>
		3	25
4	(a) Inflated sales revenue	2	
	Inflated variable costs	2	
	Capital allowances	2	
	Taxation	1	
	Working capital	3	
	Discount factors	1	
	Net present value calculation	<hr/>	<hr/>
		1	12
	(b) Net present value calculation	1	
	Internal rate of return calculation	<hr/>	<hr/>
		2	3
	(c) Net present value comment	1	
	Internal rate of return comment	1–2	
	Discussion of limitations	<hr/>	<hr/>
		3–4	5
	(d) Discussion of shareholder wealth maximisation	1–2	
	Link to share price maximisation	1–2	
	Discussion of NPV Investment appraisal method	<hr/>	<hr/>
		2–3	5
		Maximum	<hr/>
		5	25