Answers

1 (a) When making decisions, following investment appraisals of projects, net present value assumes that a decision must be made immediately or not at all, and once made, it cannot be changed. Real options, on the other hand, recognise that many investment appraisal decisions have some flexibility.

For example, decisions may not have to be made immediately and can be delayed to assess the impact of any uncertainties or risks attached to the projects. Alternatively, once a decision on a project has been made, to change it, if circumstances surrounding the project change. Finally, to recognise the potential future opportunities, if the initial project is undertaken, like the Jigu Project.

Real options give managers choices when making decisions about whether or not to undertake projects, by estimating the value of this flexibility or choice. Real options take into account the time available before a decision, on a project, has to be made, and the risks and uncertainties attached to the project. It uses these factors to estimate an additional value which can be attributable to the project. Real options view risks and uncertainties as opportunities, where upside outcomes can be exploited, and a company has the option to disregard any downside impact.

By incorporating the value of any real options available into an investment appraisal decision, Talam Co will be able to assess the full value of a project.

(b) Report to the board of directors (BoD), Talam Co

Introduction

This report assesses whether or not the Uwa Project should be undertaken based on its value from an initial net present value (NPV) calculation, and then taking into account the options provided by the offer from Honua Co and the Jigu Project. As part of the assessment, a discussion of the assumptions and their impact on the assessment is provided.

Assessment

The value of the Uwa Project based on just the initial NPV is a small negative amount of $(6,000) approximately (appendix 1). This would indicate that the project is not worth pursuing, although the result is very marginal. The offer from Honua Co, and the Jigu Project, using the real options method, gives an estimated value of $17,668,000 (appendix 2), which is positive and substantial. This indicates that the Uwa Project should be undertaken.

Assumptions

The following assumptions have been made when calculating the values in appendices 1 and 2.

- Since the Uwa Project is in a different industry to Talam Co's current activities, the project-specific, risk-adjusted cost of capital of 11% based on Honua Co's asset beta is used. It is assumed that Honua Co's asset beta would provide a good approximation of the business risk inherent in drone production.
- It is assumed that all the variables used to calculate the values of the projects in appendices 1 and 2 are correct and accurate. Furthermore, it is assumed all the variables such as inflation rates, tax rates, interest rates and volatility figures, remain as forecast through the period of each project. It is also assumed that the time periods related to the projects and the offer from Honua is accurate and/or reasonable.
- The Black-Scholes option pricing (BSOP) model is used to estimate the real option values of the Jigu Project and the Honua Co offer. The BSOP model was developed for financial products and not for physical products, on which real options are applied. The BSOP model assumes that a market exists to trade the underlying project or asset without restrictions, within frictionless financial and product markets.
- The BSOP model assumes that the volatility or risk of the underlying asset can be determined accurately and readily. Whereas for traded financial assets this would most probably be reasonable, as there is likely to be sufficient historical data available to assess the underlying asset's volatility, this is probably not going to be the case for real options. For large, one-off projects, there would be little or no historical data available. Volatility in such situations would need to be estimated using simulation models, such as the Monte-Carlo simulation, with the need to ensure that the model is developed accurately and the data input used to generate outcomes reasonably reflects what is likely to happen in practice.
- The BSOP model assumes that the real option is a European-style option which can only be exercised on the date when the option expires. In some cases, it may make more strategic sense to exercise an option earlier. The real option is more representative of an American-style option which can be exercised before expiry. Therefore, the BSOP model may underestimate the true value of an option.
- Real options models assume that any contractual obligations involving future commitments made between parties will be binding, and will be fulfilled. For example, it is assumed that Honua Co will fulfil its commitment to purchase the project from Talam Co at the start of the third year for $30 million and there is therefore no risk of non-fulfilment of that commitment.
- The BSOP model does not take account of behavioural anomalies which may be displayed by managers when making decisions.

Conclusion

The initial recommendation is that the Uwa Project should be undertaken when the offer from Honua Co and going ahead with the Jigu Project are included. Taken together, these result in a significant positive NPV. However, one or more of the above assumptions may not apply and therefore NPV value is not a 'correct' value. Instead, the appendices provide indicative value which can be attached to the flexibility of a choice of possible future actions which are embedded with the Uwa Project and indicate that it should be undertaken.

Report compiled by:

Date

(Note: Credit will be given for alternative and valid discussion comments)

APPENDICES:

Appendix 1 (Part (b) (i)):

Net present value computation of the Uwa Project before incorporating the offer from Honua Co and the financial impact of the Jigu Project. All figures are in $000s.

Year	0	1	2	3	4
Sales revenue (w1)		5,160	24,883	49,840	38,405
Less:					
Variable costs (w2)		2,064	9,581	18,476	13,716
Fixed costs		2,700	2,970	3,267	3,594
Training costs		4,128	5,749	1,848	1,372
Cash flows before tax		(3,732)	6,583	26,249	19,723
Tax (w3)		1,796	(267)	(4,200)	(1,495)
Working capital	(1,032)	(1,972)	(2,496)	1,144	4,356
Machinery purchase and sale	(35,000)				7,000
Net cash flows	(36,032)	(3,908)	3,820	23,193	29,584
Present value of cash flows (discounted at 11%)	(36,032)	(3,521)	3,100	16,959	19,488

Approximate net present value of the project = $(6,000)

Workings:

Working 1 (w1): Sales revenue

Year	1	2	3	4
Units produced and sold	4,300	19,200	35,600	25,400
Selling price ($) (inflated at 8%)	1,200	1,296	1,400	1,512
Sales revenue ($000s)	5,160	24,883	49,840	38,405

Working 2 (w2): Variable costs

Year	1	2	3	4
Units produced and sold	4,300	19,200	35,600	25,400
Variable costs per unit ($) (inflated at 4%)	480	499	519	540
Total variable costs ($000s)	2,064	9,581	18,476	13,716

Working 3 (w3): Tax

Year	1	2	3	4
Cash flows before tax	(3,732)	6,583	26,249	19,723
Tax allowable depreciation	(5,250)	(5,250)	(5,250)	(12,250)
Taxable cash flows	(8,982)	1,333	20,999	7,473
Tax payable (20%)	(1,796)	267	4,200	1,495

Appendix 2 (Part (b) (ii):

Jigu Project: Asset value

Asset value of Jigu Project of $46,100,000 is estimated as present value of future cash flows related to the project: $70,000,000 x $1{\cdot}11^{-4}$, where $70,000,000 = $60,000,000 + $10,000,000.

Honua Co offer, initial variables used to calculate the d_1, d_2, $N(d_1)$ and $N(d_2)$ figures:

Asset value (P_a) = $16,959,000 + $19,488,000 = $36,447,000 (cash flows foregone)
Exercise price (P_e) = $30,000,000
Exercise date (t) = 2 years
Risk-free rate (r) = 2·30%
Volatility (s) = 30%

Value of Honua Co offer
Value of Honua Co's offer
Call value: $36,447,000 x 0·7821 – $30,000,000 x 0·6387 x $e^{(-0·023 \times 2)}$ = $10,205,640

Honua Co's offer is equivalent to a put option.
Put value: $10,205,640 – $36,447,000 + $30,000,000 x $e^{(-0·023 \times 2)}$ = $2,409,899

Estimated total value arising from the two real options
Value of Jigu Project: $15,258,399
Value of Honua Co's offer: $2,409,899

Estimated total value from the two real options: $2,409,899 + $15,258,399 = $17,668,298

(c) The overarching issue is that of conflict between the need to satisfy shareholders and the financial markets, and Talam Co's stated aims of bringing affordable environmentally friendly products to market and maintaining high ethical standards. This overarching issue can be broken down into smaller related issues.

Producing profitable products will presumably result in positive NPV projects, thus ensuring a continued strong share price performance. This should satisfy the markets and shareholders. However, if the products cannot be sold at a reasonable selling price because some farmers are not able to afford the higher prices, then this may compromise Talam Co's aim of bringing environmentally friendly products to market and making them affordable.

A possible solution is to lower production costs, by shifting manufacturing to locations where such costs are lower. Talam Co's BoD thus considered the move to Dunia, to lower production costs. This presumably would allow Talam Co to reduce prices and make the drones more affordable, but at the same time ensure that the projects result in positive NPVs. However, the issue here is that supplier companies in Dunia whom Talam Co trades with use young teenage children as part of their workforce. This may impact negatively on Talam Co's stated aim of maintaining high ethical standards. In fact, Talam Co may need to rethink its links with companies it trades with in Dunia entirely. Otherwise there is a real risk that Talam Co could suffer from long-term loss of reputation, and this may cause substantial and sustained financial damage to the company.

Talam Co may decide that maintaining its share price and its reputation should take the highest priority and therefore it may reach a decision that the best way to address the issue(s) is to not try to reduce costs, and to withdraw from Dunia completely. But this would prevent many agriculturalists from taking advantage of the biodegradable drones. Therefore, Talam Co may want to explore alternative ways to meet all the aims.

Talam Co could consider moving to another location, if this was feasible. It is not known from the narrative whether or not viable alternatives are available, but Talam Co would need to ensure that possible alternative locations would have the infrastructure to produce the components at the same or lower costs. Talam Co may also want to consider the softer issues; for example, it will want a good working relationship and network in the new locations which it has with the companies in Dunia. These may need to be developed and would take time and probably incur additional costs.

For these reasons, Talam Co may decide to explore the existing production facilities in Dunia further. It is possible that the supplier companies are not exploiting the young teenage children, but are supporting their education and their families in a positive way. Stopping the relationship may jeopardise this support. Talam Co would need to investigate the working conditions of the children and the manner in which they are rewarded and supported. It may want to consult the guardians of the young teenage children and see if there are other feasible solutions. For example, could the guardians be employed instead of the young teenage children or are they already engaged in alternative employment?

After all factors are considered, Talam Co may conclude that the best way to achieve all its aims is to continue in Dunia and also have the production of drone components located there. If this is the case and young teenage children continue to be employed there, then Talam Co would need a sustained public relations campaign to defend its position and demonstrate how it ensures that the teenage children have not been exploited, but are gainfully employed and receiving a good education to help them progress in life.

(Note: Credit will be given for alternative and valid discussion comments)

2 (a) Options

Buy put options as need to hedge against a rise in interest rates.

Number of contracts required: $84,000,000/$2,000,000 x 6/3 = 84

Total basis = current price (1 May) – futures price = (100 – 4·50) – 95·05 = 0·45

Unexpired basis on 1 September = 0·45 x 1/5 = 0·09

Expected futures price = 100 – 5·1 – 0·09 = 94·81

Exercise price	95·25
Futures price as above	94·81
Exercise?	Yes
Gain in basis points	44

	$
Interest paid ($84,000,000 x 5·6% x 6/12)	2,352,000
Gain from options 0·0044 x $2,000,000 x 3/12 x 84	(184,800)
Premium 0·00411 x $2,000,000 x 3/12 x 84	172,620
Net payment	2,339,820
Effective annual interest rate 2,339,820/84,000,000 x 12/6	5·57%

Swaps

	Lurgshall Co	Counterparty	Interest rate differential
Fixed rate	5·60%	6·10%	0·50%
Floating rate	LIBOR + 0·50%	LIBOR + 1·50%	1·00%

Lurgshall Co has an advantage in borrowing at both fixed and floating rates, but the floating rate advantage is larger.

Gain % for Lurgshall Co = 50% (1 – 0·5 – 0·2) = 0·15

	Lurgshall Co	Counterparty
Rate without swap	(5·60%)	(LIBOR + 1·50%)
Benefit	0·15%	0·15%
Net result	(5·45%)	(LIBOR + 1·35%)

Swap

Borrows at	(LIBOR + 0·50%)	(6·10)
Lurgshall Co pays	(4·85%)	4·85%
Counterparty pays	LIBOR	(LIBOR)
Bank fee	(0·10%)	(0·10%)
Net result	(5·45%)	(LIBOR + 1·35%)

Comments

The swap gives a result which is marginally worse than the forward rate agreement and the futures. The options give a worse result than the other choices.

Risks which might be considered include counterparty risk for the forward rate agreement and swap. Using Birdam Bank should mean that this risk is low for forward rate agreements, and also for swaps, assuming that the bank bears the risk of the counterparty defaulting.

Basis risk should be considered for the traded futures. Here, because the differences between the instruments are small, a failure to estimate basis accurately may mean that futures are chosen when they do not offer the lowest borrowing cost. For the swaps, if Lurgshall Co swaps into fixed rate debt, it faces the market risk of an unexpected fall in interest rates.

Other factors to consider include the possibility that rates will increase rather less than forecast, meaning that the option would not be exercised and at some point would be the lowest cost choice. The length of time of the swap also needs to be considered. Although it commits Lurgshall Co to the fixed rate, if the borrowing turns out to be longer than the six months, the swap may provide a better time match than the other hedging opportunities.

(b) Advantages of swaps

Transaction costs are generally relatively low. If Lurgshall Co arranged the swap itself, the costs would be limited to legal fees. The transaction costs may also be lower than the costs of terminating one loan and arranging another.

Lurgshall Co can, as here, swap a commitment to pay a variable rate of interest which is uncertain with a guaranteed fixed rate of interest. This allows Lurgshall Co to forecast finance costs on the loan with certainty.

Swaps are over-the-counter arrangements. They can be arranged in any size and for whatever time period is required, unlike traded derivatives. The period available for the swap may be longer than is offered for other interest rate derivatives.

Swaps make use of the principle of comparative advantage. Lurgshall Co can borrow in the market where the best deal is available to it, and then use the swap to access the loan finance it actually wants at an overall cheaper cost.

Disadvantages of swaps

Swaps are subject to counterparty risk, the risk that the other party to the arrangement may default on the arrangement. This would apply in particular if Lurgshall Co arranged the swap itself. If it is arranged through a bank, the bank can provide a guarantee that the swap will be honoured.

If Lurgshall Co swaps into a fixed rate commitment, it cannot then change that commitment. This means it cannot take advantage of favourable interest rate changes as it could if it used options. This may be a particular problem if the swap period is more than a few months and interest rates are expected to be volatile.

As swaps are over-the-counter instruments, they cannot be easily traded or allowed to lapse if they are not needed or become no longer advantageous. It is possible that a bank may allow a reswapping arrangement to reverse a swap which is not required, but this will incur further costs.

(c) The chief executive appears to underestimate the degree of knowledge required for day-to-day work. Less experienced staff may be able to arrange borrowing if the lender has already been chosen or, for example, arrange forward rate agreements to be used if they are prescribed.

However, if judgement is required as to, for example, which lender or hedging instrument to use, using less experienced staff may mean that a sub-optimal decision is taken. Poor decisions may result in opportunity costs, for example, not using the lender who gives the best deal or being committed to a fixed forward rate agreement when an option would have allowed the business to take advantage of favourable rate movements. These opportunity costs may not be as clear as the salary costs of experienced staff.

As the business operates internationally, the treasury department will need to monitor financial market conditions and exchange rates, and other issues which may be significant such as political developments. Because of their previous experiences, longer-serving staff are more likely to appreciate the implications of developments and whether treasury policies and decisions need to change in response to changes in risk. Senior staff are also needed to manage the work of less experienced staff to prevent or mitigate the effect of mistakes which may be costly.

Experienced staff are also needed to establish overall guidelines and policies for treasury activities. Their judgement will be required to establish principles which will mean that actions taken by staff are in line with the risk appetite of the business and are sufficiently prudent from the viewpoint of risk management. Experienced staff will also have greater knowledge of law, accounting standards and tax regulations, which can help the business avoid penalties and perhaps structure its dealings so that it can, for example, minimise the level of tax paid.

The chief executive has plans for a major expansion of the business, involving significant investment and financing decisions. Advice from experienced treasury staff will be invaluable in supporting the decisions required. If Lurgshall Co is planning a major acquisition, the treasury function can provide advice on the structure of consideration and financing implications. If, as here, a major investment is being contemplated, experienced staff can advise on translating views on risk into a relevant cost of capital, which will help ensure that the financial appraisal of the investment is realistic.

3 (a) **Advantages of demerger**

If the managers of the sportswear division's belief that they can run the division better without the interventions of senior management at Newimber Co is well-founded, the business may be able to achieve operational efficiencies and increases in value.

The new company is not tied to the financial commitments associated with the formal clothing division in terms of finance cost and loan repayment. Its management will have the ability to determine the finance structure which best suits the new business.

Newimber Co's shareholders will continue to own both companies. If shareholders are concerned about the diversification of their portfolio, this will remain unchanged.

The demerger may allow Newimber Co's management team to focus on the formal clothing division. They should not need to spend time dealing with disagreements with the sportswear division's management team.

Disadvantages of demerger

There will be legal costs associated with the demerger, such as the cost of obtaining a listing for the new company arising out of the sportswear division. Also setting up the new company and establishing the new structure looks likely to take up significant management time. This may mean that neither company is focused on external opportunities and challenges for some time, maybe impacting results and competitive position.

Both the new companies may suffer adverse effects through being smaller entities. Economies of scale may be lost and the companies may find it less easy to raise new finance. Looking at the position across both companies in total, distributable profits may fall because of a rise of overheads as each company will need its separate infrastructure and service departments.

The current arrangement may frustrate the management of the sportswear division but the command structure is clear. Once the director-shareholders of Newimber Co merely become shareholders of the new company, they will not be able to intervene actively in its management and overrule its management team. Agency problems may arise if these shareholders have different attitudes to risk to Poynins Co's board or different views on the importance of short-term versus long-term objectives.

(b) **Current WACC Newimber Co**

k_e is 11·8% and k_d is 4·5%

Annuity factor 4·5% for 5 years $= 1 - (1 + 0{\cdot}045)^{-5}/0{\cdot}045 = 4{\cdot}390$

Loan value per \$100 = (\$5·90 x 4·390) + (\$105·00 x $1{\cdot}045^{-5}$) = \$110·16

MV_d = \$110·16/100 x \$200 million = \$220 million

WACC = ((585 x 11·8%) + (220 x 4·5% x 0·72))/805 = 9·5%

New WACC Newimber Co

MV_e is \$351 million

$\beta_e = 1{\cdot}21\ ((351 + (220\ (1 - 0{\cdot}28)))/351) = 1{\cdot}76$

$k_e = 3{\cdot}4\% + (1{\cdot}76 \times 6\%) = 14{\cdot}0\%$

WACC = ((351 x 14·0%) + (220 x 4·5% x 0·72))/571 = 9·9%, an increase of 0·4%

WACC Poynins Co

Current β_a of Newimber Co = $1{\cdot}4(585/(585 + (220\ (1 - 0{\cdot}28)))) = 1{\cdot}10$

β Poynins Co = $(1{\cdot}10 - (0{\cdot}6 \times 1{\cdot}21))/0{\cdot}4 = 0{\cdot}935$

WACC Poynins Co = 3·4% + (0·935 x 6%) = 9·0%

Free cash flows Poynins Co

Year	1	2	3
	\$m	\$m	\$m
Operating cash flows	45·0	54·0	62·1
Tax	(12·6)	(15·1)	(17·4)
Post-tax cash flows	32·4	38·9	44·7
Investment in assets	(20·0)	(22·0)	(22·0)
Free cash flows	12·4	16·9	22·7
Discount factor (9%)	0·917	0·842	0·772
Discounted cash flows	11·4	14·2	17·5

Discounted free cash flows Years 1 to 3 = \$43·1m

Discounted post-tax cash flows Year 4 onwards = (\$44·7m (1 + 0·02)/0·09 – 0·02) = \$651·3m x 0·772 = \$502·8m

Discounted investment in assets Year 4 onwards = (25/0·09) = \$277·8m x 0·772 = \$214·5m

Poynins Co's valuation = \$43·1m + \$502·8m – \$214·5m = \$331·4m

Discussion

If the managers' estimates of the sportswear division's future free cash flows are realistic, then the valuation using free cash flows (\$331·4m) exceeds the current valuation (\$585m – \$351m = \$234m).

The valuation is dependent upon achieving ambitious growth targets in Years 1 to 3, particularly given the loss of economies of scale discussed above. The board and shareholders of Newimber Co would want details about the assumptions behind these figures, particularly as growth after that is only assumed to be 2%. The valuation is also dependent upon the investment figures being accurate, so directors and shareholders would again need more detail of these so that they can decide whether the extra investment is likely to generate the increased cash flows predicted.

They would also want to determine how the managers of the sportswear division plan to fund the investments, particularly if initial operating cash flows are not as high as expected.

The restructuring will lead to a marginal increase in the WACC of Newimber Co, as its financial risk increases with more gearing. The directors may be worried that Newimber Co's credit rating will fall.

(c) Requirement for business review

The directors of Poynins Co will have to fulfil the same statutory and listing requirements as Newimber Co currently fulfils. These are likely to include the requirements for a business review.

Investors are likely to be particularly interested in how future strategies for Poynins Co may differ from those which have been pursued recently. They are also likely to want to know about attitudes to risk management and risk management policies, as the new company appears to be likely to be more risk-seeking than the old division. They will also want to know about changes in finance policy, particularly if dividend policies are likely to differ.

Communication with stakeholders

Poynins Co's directors are likely to communicate with major shareholders on a regular basis, more than once a year. These will include the director-shareholders actively involved in Newimber Co and external investors. Poynins Co's directors will need to ensure that what they communicate keeps both sets of shareholders happy if the two groups have different priorities.

Poynins Co's directors will also have to be mindful of the need to communicate what their plans are to other important stakeholders. Employees and suppliers are particularly important here, as Poynins Co's board has plans for operational efficiencies. Employees may be interested in being informed about changes in working conditions. Attempts to impose tougher conditions on employees without communication or consultation may lead to employee departures or other disruptions. Suppliers will be interested in changes to payment arrangements. Suppliers may be concerned anyway about dealing with a new, smaller company, so may seek to impose shorter credit periods or lower credit limits if they do not have sufficient information.

Use of integrated reporting

In particular, Poynins Co's directors will have to consider if, and how, they use integrated reporting. They are not bound by the decision of Newimber Co's directors to prepare an integrated report. However, if they do not do so, it may suggest to investors and other stakeholders that the directors are not keen to disclose information about how the business is using its resources and maintaining relationships. This may affect their confidence in how the directors are running the company.

If the directors decide to prepare an integrated report for Poynins Co, readers of the accounts are likely to look for significant differences between this report and the integrated report of Newimber Co, and how the differences are justified. These may include differences in the approach to value creation, the outlook for the business and whether the information has been prepared and presented in different ways.

(Note: Credit will be given for alternative, valid comments)

					Marks
1	**(a)**	1–2 marks per well-discussed comment		**Max**	5
	(b)	**(i)**	**(Appendix 1)**		
			Sales revenue		2
			Variable costs		2
			Fixed costs		1
			Training costs		2
			Tax		2
			Working capital		2
			Uwa Project net present value		1
					12
		(ii)	**(Appendix 2)**		
			Jigu Project: underlying asset value		2
			Honua Co offer: exercise price		1
			Honua Co offer: underlying asset value		2
			Honua Co offer: other variables used in option calculation		1
			Honua Co offer: call value		1
			Honua Co offer: put value		2
					9
		(iii)	Initial assessment of value of Uwa Project		2–3
			Up to 2 marks per well-discussed assumption (Max 4 marks if assumptions related to real options are not discussed)		8
				Max	10
			Professional marks for part (b)		
			Report format		1
			Structure and presentation of the report		3
					4
	(c)	Discussion of the issues			4–5
		Discussion of how the issues may be addressed			5–6
				Max	10
				Total	**50**

				Marks
2	**(a)**	**Options**		
		Buy put options		1
		Number of contracts		1
		Basis calculation		1
		Premium calculation		1
		Exercise option?		1
		Final outcome		1
		Swaps		
		Comparative advantage and recognition of benefit		2
		Initial decision to borrow floating by Lurgshall Co and fixed by counterparty		1
		Swap impact		2
		Net benefit after bank charges		1
		Comments		3–4
			Max	**15**
	(b)	Advantages of swaps		2–3
		Disadvantages of swaps		2–3
			Max	**5**
	(c)	1–2 marks per relevant point	**Max**	**5**
			Total	**25**
3	**(a)**	Advantages of demerger		2–3
		Disadvantages of demerger		2–3
			Max	**5**
	(b)	MV_d		2
		Pre demerger WACC		1
		New β_e and k_e Newimber Co		1
		New WACC Newimber Co		1
		Pre demerger β_a		1
		β Poynins Co		1
		WACC Poynins Co		1
		Discounted free cash flows Poynins Co Years 1 to 3		3
		Discounted free cash flow Poynins Co Year 4 onwards		2
		Discussion		2–3
			Max	**15**
	(c)	1–2 marks per relevant point	**Max**	**5**
			Total	**25**