

---

# Answers

---

1 Mercury Training

- (a) The solution strategy for this part of the question is to determine the proxy beta by weighting the individual asset betas and then gearing them to the level appropriate for Mercury Training Ltd. The difficulty is that the gearing should be tax adjusted. The required conversion formula is shown in the formula sheet. The equity and weighted average costs of capital are then straightforward.

The tax adjusted gearing for Jupiter and for the financial services sector, given a tax rate of 40%, is as follows:

$$\text{Jupiter: } w_d^i = \frac{1-T}{w_d^{-1}-T} = \frac{0.6}{0.12^{-1}-0.4} = 7.56\%$$

$$\text{Financial Services Sector: } w_d^i = \frac{1-T}{w_d^{-1}-T} = \frac{0.6}{0.25^{-1}-0.4} = 16.67\%$$

Note: other approaches to calculating the tax adjusted gearing for Jupiter are acceptable. Calculating the amount of debt for Jupiter can be found as follow:

$$1-w_d = \frac{E}{D+E}$$

$$D = \frac{E}{1-w_d} - E = \frac{29}{0.88} - 29 = \$3.96 \text{ million}$$

Using this debt value and the stated equity value of \$29 million the tax adjusted gearing for Jupiter is as follows:

$$w_d = \frac{D(1-T)}{E+D(1-T)} = \frac{9.96 \times 0.6}{29 + 3.96 \times 0.6} = 7.56\%$$

The asset beta for Jupiter is as follows:

$$\begin{aligned} \beta_A &= \beta_e(1-w_d^1) \\ \beta_A &= 1.5 \times (1-0.0756) \\ \beta_A &= 1.387 \end{aligned}$$

Repeating the same exercise for the financial services sector using the gearing ratio of 16.66% and an equity beta of 0.9 gives an asset beta as follows:

$$\begin{aligned} \beta_A &= \beta_e(1-w_d^1) \\ \beta_A &= 0.9 \times (1-0.1667) \\ \beta_A &= 0.75 \end{aligned}$$

The proxy asset beta for Mercury is as follows:

$$\beta_{A(\text{mercury})} = (0.67 \times 1.387) + (0.33 \times 0.75) = 1.177$$

The proxy equity beta for Mercury is calculated by converting the quoted market gearing of 30% to the tax adjusted rate and then using the formula above expressing the relationship between the equity and asset beta as follows:

$$w_d^1 = \frac{1-T}{w_d^{-1}-T} = \frac{0.6}{0.30^{-1}-0.4} = 20.45\%$$

$$\beta_E = \frac{\beta_A}{(1-w_d^1)}$$

$$\beta_E = \frac{1.177}{(1-0.2045)}$$

$$\beta_E = 1.480$$

The equity and weighted average costs of capital are then as follows:

$$r_e = R_F + \beta_i(R_m - R_F)$$

$$r_e = 0.045 + 1.480 \times 0.035 = 9.68\%$$

And WACC:

$$WACC = w_e r_e + w_d r_d (1-T)$$

$$WACC = 0.7 \times 0.0968 + 0.3 \times (0.045 + 0.025) \times 0.60 = 8.04\%$$

The equity cost of capital is used for valuing income flows (such as dividends or free cash flow to equity) which go directly to the equity investor. The weighted average cost of capital is for valuing flows attributable to the business entity such as project cash flows or NOPAT.

- (b) This part of the question requires advice on the likely range of prices.

At the low end the firm's net assets at fair value would be the realisable value of the equity between a willing buyer and seller. This is 650c per share which would represent the lower end of any negotiating range.

Using the dividend valuation model we estimate the share price at the upper end using the latest DPS of 25¢ per share and the cost of equity capital of 9.68%. Three potential growth rates present themselves: the historic earnings growth which at 12% is greater than the firm's equity cost of capital and is therefore not sustainable over the very long run, the anticipated growth rate of the two sectors weighted according to the firm's revenue from each ( $0.67 \times 6\% + 0.33 \times 4\% = 5.33\%$ ) and the rate implied from the firm's reinvestment:

$$g = br_e = \frac{(100 - 25)}{100} \times 0.0968 = 7.26\%$$

The value of the firm using the growth model and the higher of the two feasible growth rates is:

$$P_0 = \frac{D_0(1+g)}{r_e - g}$$

$$P_0 = \frac{25 \times (1.0726)}{(0.0968 - 0.0726)} = \$11.08 \text{ per share}$$

In addition, the share price gives a spot estimate of the value of a dividend stream in the hands of a minority investor. If the option to float is taken then a share price of \$11.08 could be achieved especially if a portion of the equity and effective control are retained. However, if a sale is made to a private equity investor then it may be appropriate to value the firm taking into account the benefits of control which can be substantial if the purchaser is able to generate significant synergistic benefits either in terms of revenue enhancement, cost efficiency or more favourable access to the capital market. Control premiums can be as much as 30–50% of the spot price of the equity. In this case an opening negotiation may start with a share price of \$16.62.

- (c) **The Directors**  
**Mercury Training**

The two principal sources of large-scale equity finance are either through a public listing on a recognised stock exchange or through the private equity market. The former represents the traditional approach for firms who have grown beyond a certain size and where the owners wish to release, in whole or in part, their equity stake within the firm, or where they wish to gain access to new, large scale equity finance. The procedure for gaining a public listing is lengthy and invariably requires professional sponsorship from a company that specialises in this type of work. Depending upon the jurisdiction there are three stages that may have to be fulfilled before a firm can raise capital on a stock exchange:

- 1 Formalise the company's status as a public limited company with rights to issue its shares to the public. In some jurisdictions this requires re-registration and in others it is implicit in the conferment of limited liability.
- 2 Seek regulatory approval for admission to a public list of companies who have met the basic criteria required for entry to a stock exchange (in Singapore this process is under the jurisdiction of the Singapore Exchange).
- 3 Fulfil the requirements of the exchange concerned which may entail the publication of a prospectus which is an audited document containing, among other things, projections of future earnings and profitability.

The disadvantage of public listing is that a company will be exposed to stake building by other companies, regulatory oversight by the stock exchange and greater public scrutiny. Stock exchanges require that quoted companies comply with company law as a matter of course but also that they adhere to various codes of practice associated with good governance and takeovers. They must also comply with stock exchange rules with respect to the provision of information and dealing with shareholders.

Private equity finance is the name given to finance raised from investors organised through the mediation of a venture capital company or a private equity business. As the name suggests these investors do not operate through the formal equity market but they operate within the context of the wider capital market for high risk finance. Because of its position, PEF does not impose the same regulatory regime as the public market. Transaction costs tend to be lower and there is evidence to suggest that private equity finance offers companies the ability to restructure and take long term decisions which have adverse short term consequences. In some jurisdictions there are favourable tax advantages to private equity investors.

## 2 Venus Systems

This question focuses on the problems of a tied supplier which has experienced a downturn in its business because of factors largely beyond its control. The candidates' report should focus on the problems of managing business cycles, the nature of financial distress, working capital management and turnaround.

### The Board of Directors Venus Systems Ltd (VSL)

From: Molly Quelle, Financial Advisor

#### (a) Analysis of the current financial situation and advice on future business prospects.

Since 2006 your company (VSL) has experienced a sudden drop in business turnover with falls of 2% in 2007 and 17.7% in 2008. Bottom line performance has been more mixed for reasons noted in your briefing but the position is now that VSL is only just in profit. The company is in distress and it is worth reflecting for a moment on the five core causes of financial distress in any business:

- Revenue failure caused by either internal or external factors. Revenue failure may be through a loss of orders (market failure) or through the acceptance of business which does not contribute to the growth of shareholder value.
- Cost failure caused by weak cost control, changes in technology, inappropriate accounting policies, inadvertent or exceptional cost burdens, poor financial management or failure of effective governance.
- Failure in asset management through failure to invest in appropriate technology, poor working capital management, inappropriate write off and reinvestment or poor organisation of the available assets.
- Failure in liability management through failure to manage the company's relationship with the money markets, weak control of interest rate risk and currency risk or unsustainable credit policies.
- Failure of capital management through either over or under-capitalisation or poor management of the company's relationship with the capital markets and in particular the company's debt portfolio and the optimisation of its cost of capital.

In practice problems rarely occur in isolation. A business is an internal and external network of relationships of assets and individuals and problems in one area invariably have consequences elsewhere. To structure my investigation I have focused on the four areas of performance, efficiency, risk and liquidity and used a variety of accounting measures under each heading to identify the principal problem areas and the potential remedies.

#### (b) Performance

VSL has experienced problems in its two principal areas of activity through failure in its market. In the case of the military business sustained global hostilities have come to an end and military spending, as it did in the early 1990s, has begun to slow down to a maintenance level. However, on the civil side there is no reason to doubt that once production against advance orders for the new European Aircoach commences orders for VSL components will rapidly accelerate. There has been significant rebalancing of the firm's production, new investment took place in 2006 and is planned for 2009, and steps have been taken to reskill and redeploy the workforce.

On the cost management side there are some general issues and steps that can be taken. The company's gross margin is very consistent and typical of manufacturing at 60% before depreciation is charged. It may be that the company can secure greater cost efficiency through focusing on the reduction of change, logistic and other non-value adding costs. The firm's depreciation policy should also be reconsidered. The average rate of 10% per annum is appropriate for fixed equipment but not for buildings and land.

In 2007 the company's operating profit margin was 12.5% but has since deteriorated sharply because of the fall in revenues. Other operating costs have risen by more than general inflation at 7% for 2007/8 and 5% for 2006/7. This is a significant cause for concern and should be investigated further. As a consequence of the deterioration of revenues the company's return on capital employed, return on equity and other return measures have all deteriorated rapidly. These all reflect the general failure of profitability. However, one pair of ratios is worthy of comment and that is the relationship between return on capital employed and return on fixed capital employed.

Ratios	2008 \$m	2007 \$m	2006 \$m
Earnings before interest and tax/Total capital employed	1.53%	12.28%	7.49%
Earnings before interest and tax/Fixed capital employed	9.18%	29.72%	9.52%

The key point to note here is not the sudden change in 2007 due to the commissioning and decommissioning of capital equipment but the loss in return because of the company's working capital management. If a company has a neutral working capital management policy, with a current asset ratio equal to unity, then these two ratios should be approximately the same. The higher the current asset ratio, the lower the return on capital employed versus the return on fixed capital employed and vice versa. In manufacturing, it is rarely possible to operate with current asset ratios less than one and so this points to working capital management as a priority area for the company.

Finally, it is clear from the collapse in the share price that the market recognises the difficulties that the company is facing. However the company's P/E ratio clearly indicates that the market expects the business to recover.

## Efficiency

The company's asset efficiency has rapidly increased from 107% in 2006 to 427% in 2009. This has been mostly due to the rationalisation of the firm's capital assets and the sale of the non-productive refuelling gear plant. With respect to cost efficiency the company's production costs appear to be well controlled with a 5% improvement in 2007 but a 5% deterioration in 2008. Given the problems of redeployment and restructuring cost management at this level does not appear to be of concern. However, when we turn our attention to the efficiency with which the VSL converts its activities into cash, a significant problem does emerge:

Ratios	2008	2007	2006
\$m	\$m	\$m	
<i>operating cycle analysis</i>			
receivables*365/turnover	183	91	71
inventory*365/cost of sales (ex depn)	146	73	82
trade and other payables*365/cost of sales (ex depn)	34	32	36
scale adjustment (see below)	0.77	0.67	0.67
adjusted receivables age (days) 141	61	47	
adjusted inventory days	113	49	54
funded/(unfunded) days	-220	-77	-66
cash requirement (\$ millions)	34	12	11

Because of the difference in the magnitude of the cash flow recovered from customers compared to that required to settle outstanding payables a scale adjustment is required to estimate the average number of days that the operation cycle is unfunded. For example, in 2008:

$$\text{Scale adjustment} = (\text{operating costs} - \text{depreciation})/\text{revenue} = (44 + 27 - 15)/72.6 = 0.77$$

When comparing with a given payables age we effectively reduce the receivables period from 183 to 141 days and the inventory holding period from 146 to 113 days. The unfunded period is the sum of the adjusted receivable and inventory periods (254 days) less the payables period of 34 days to give 220 days of cash outflow not covered by the cash recovered from customers. As noted above the payment period to creditors has remained constant at around 34 days. However, the number of unfunded days has risen from 66 days in 2006 to 220 days in 2008 committing an additional \$21 million of cash compared with 2006 to the maintenance of working capital. As a matter of urgency, the company needs to bring the figures for receivables back down to the 2006 levels although inventories may be more difficult to reduce in the short run.

## Risk

Of key concern is the prospect of default. Our assessment is that in the short run the risk is moderate but not imminent. The Z score for the business (which predicts failure within five years with 80% accuracy) has fallen to 2.54 in 2008 from 3.33 in 2007. At this level it lies within an indeterminate region where many companies survive.

Depending on how candidates treated 'total debt' minor variations in the Z score can arise. The examiner accepted as correct all reasonable interpretations of the inputs to the score. Using total liabilities the following ratios and Z score are obtained:

Z score analysis	factor	2008	2007	2006
$X_1$ = working capital/total assets	1.2	0.75	0.56	0.20
$X_2$ = retained earnings/total assets	1.4	0.33	0.32	0.23
$X_3$ = earnings before interest and tax/total assets	3.3	0.01	0.10	0.06
$X_4$ = market value of equity/book value of total debt	0.6	0.90	1.98	1.41
$X_5$ = sales/total assets	1.0	0.60	0.70	0.66
<b>Z score</b>		<b>2.54</b>	<b>3.33</b>	<b>2.27</b>

An alternative approach attributable to William Beaver's (1966) work on corporate failure gives further cause for concern. The company's operating cash flow to total debt ratio has fallen below the survival threshold of 0.15. Currently the ratio is at -0.16 reflecting the fall in operating cash flows largely due to the increase in working capital.

The firm's operational gearing is 37% compared with 26% in 2006 which reflects the increase in the firm's fixed operating costs noted earlier. However, the principal concern is the firm's ability to pay its immediate interest payments and it is to this that the Beaver ratio points as a key indicator of the firm's short run survival.

## Liquidity

As we have already noted the firm's cash generation has fallen rapidly, the sell-off of assets in 2007 and 2008 has released significant cash into the business and the company has \$56.1 million in hand. The current asset and acid test ratios confirm what we already know, but of more significance is the cash exhaustion ratio which tells us that the available cash could sustain over a year of operations without any additional revenue. In our judgement, there is enough cash in the business to sustain the reinvestment planned of \$35 million and to repurchase 10% of the firm's equity at a cost of \$5 million. However, it is not clear at this stage that an increase in the firm's gearing would offer a significant benefit to the firm's cost of capital nor is it clear, in advance of a possible and sudden expansion of the firm's civil business, that the cash resources of the business should be returned to the investors in a share repurchase.

**(c) Ethical and Governance**

When a company is in financial distress it is particularly important that the company maintains the highest standards of corporate governance and ethical responsibility. As non-executive directors, it is clear that in commissioning this report you are exercising your responsibilities effectively. It is also clear that the executive directors are being both open and conscientious in supplying you with relevant financial information and details of the plans that they have in order to help the business recover from this downturn in its business activities. At this point in the company's financial fortunes it is worth re-emphasising the importance of sound internal control and of maintaining good relations with investors. The company has historically relied upon the diversification of its aerospace business between military and civil markets. This has been a source of the company's strength and it is particularly unfortunate that the substantial delays in the European Aircoach business have led to a collapse in the company's performance. The capital markets have appreciated the problem, as we would expect, but at this sensitive time it is important that the company makes careful profit forecasts in line with what it can reasonably expect and does not try to inject a sense of false optimism into its future prospects.

At this stage, and given the company's substantial cash holdings, it is to be expected that other companies may see Venus Systems Limited as an attractive target for a takeover bid. It is important from a shareholder perspective that all such bids are reviewed carefully and that any decisions you make are made as a whole board without any sectional interests. Although there does not appear to be a potential acquirer at the moment the company should be on its guard for any untoward stake building and regular monitoring of changes in the company's share register should be undertaken.

Ethically, the company has performed as would be expected of a high quality, long established business of this type. There is a body of opinion that any company that engages in the military market cannot be classified as 'ethical' for investment purposes.

However, leaving that on one side the company has attempted to minimise the impact of the downturn in its business upon its key stakeholder groups and in particular through redeployment and reskilling of staff, the maintenance of good payment policies with respect to its suppliers, and the transparency with which it has conducted its business.

**Recommendations:**

The directors' proposed recovery plan is based upon the assumption of a rapid return to growth of the civil aviation business. There is no doubt that the company has suffered significantly from delays in production of the European Aircoach. Contingency plans should be put in place for further delays in the start of that project. The commitment of management to the reduction of the company's working capital to its 2006 levels is commendable and will be the source of short-term cash flow required to offset any further operating losses caused by further delay in the Aircoach business. In our view, the capital reinvestment programme of \$35 million should proceed but further consideration of the advisability of the share buyback should be given based upon an assessment of the impact upon the firm's cost of capital and market value.

**3 Asteroid Systems**

**Currency hedging.**

The objective is to fix (Euro/SFr) currency exchange rates for two months for an expected remittance of SFr 2.4299 million. This is achieved with a money market hedge for the two month exposure.

**(a) Hedging the two month Swiss franc exposure**

Forward contracts in the money market are the most straightforward way of eliminating transaction risk. The exposure to movements in the Swiss Franc can be eliminated by entering into a forward contract to purchase the currency at Euro SFr 1.6199 (see note 1). Alternatively, given access to money market finance in the Swiss market a reverse money market hedge can be established by borrowing in SFr and depositing in Euros. Given that the interest rates can be locked in this would offer a better forward rate at two months at any borrowing rate less than SFr LIBOR + 7 (note 2).

**Supporting notes**

**Note (1)**

The current expectation of remittances is based upon an estimate of the two month forward rate of  $(1.6223 + 1.6176)/2 = 1.6199$  for the Swiss Franc

Swiss Francs =  $1.6199 \times 1.5m = \text{SFr } 2.4299$  million in two months using the forward rate above.

**Note (2)**

The money market hedge is based upon interest rate parity and using the IRP formula we can calculate the maximum rate of interest that can be borne for the money market hedge to be worthwhile.

The technique for a reverse money market hedge is identical to that for a conventional hedge except that the counter currency is borrowed in the foreign market, converted at spot and deposited in the domestic market. However, for a money market hedge to work, the company must be able to secure short term fixed rate finance in both the base and the counter currency area. With the SFr exposure it is possible to borrow at fixed in the Swiss market. Using the no arbitrage condition of the interest rate parity formula we can determine the maximum rate of interest the company should agree in creating a money market hedge. The interest rate in the base currency to use is the best rate for depositing in the Euro market:

$$1.6199 = 1.6244 \times \frac{\left(1 + i_c \times \frac{2}{12}\right)}{\left(1 + 0.03725 \times \frac{2}{12}\right)}$$

$$i_c = 2.13\%$$

If the company can borrow at less than spot Swiss 2.13% in the Swiss market then the money market hedge will be preferred to a forward sale of SFr 1.5 million.

**(b) The relative advantages and disadvantages of the use of a money market hedge versus exchange traded derivatives**

A money market hedge is a mechanism for the delivery of foreign currency, at a future date, at a specified rate without recourse to the forward FOREX market. If a company is able to achieve preferential access to the short term money markets in the base and counter currency zones then it can be a cost effective substitute for a forward agreement. However, it is difficult to reverse quickly and is cumbersome to establish as it requires borrowing/lending agreements to be established denominated in the two currencies.

Exchange traded derivatives such as futures and foreign exchange options offer a rapid way of creating a hedge and are easily closed out. For example, currency futures are normally closed out and the profit/loss on the derivative position used to offset the gain or loss in the underlying. The fixed contract sizes for exchange traded products mean that it is often impossible to achieve a perfect hedge and some gain or loss on the unhedged element of the underlying or the derivative will be carried. Also, given that exchange traded derivatives are priced in a separate market to the underlying there may be discrepancies in the movements of each and the observed delta may not equal one. This basis risk is minimised by choosing short maturity derivatives but cannot be completely eliminated unless maturity coincides exactly with the end of the exposure. Furthermore less than perfectly hedged positions require disclosure under IFRS 39. Although rapid to establish, currency hedging using the derivatives market may also involve significant cash flows in meeting and maintaining the margin requirements of the exchange. Unlike futures, currency options will entail the payment of a premium which may be an expensive way of eliminating the risk of an adverse currency movement.

With relatively small amounts, the OTC market represents the most convenient means of locking in exchange rates. Where cross border flows are common and business is well diversified across different currency areas then currency hedging is of questionable benefit. Where, as in this case, relatively infrequent flows occur then the simplest solution is to engage in the forward market for hedging risk. The use of a money market hedge as described may generate a more favourable forward rate than direct recourse to the forex market. However the administrative and management costs in setting up the necessary loans and deposits are a significant consideration.

**(c) The only risk which will impact on a firm's cost of capital is that risk which is priced in either the equity or the debt markets. Considering these two markets in turn:**

Currency risk forms part of a firm's exposure to market risk and will impact on a firm's cost of capital through its beta value and, as a result, its equity cost of capital. The extent to which this is significant depends on the exposed volume of currency transactions conducted in a given period, the average duration of the exposure and the correlation of the currency with the market. If a given currency has the same correlation with the market as the company, removing currency risk will have no impact on the firm's overall exposure to market risk and as a result no impact on the firm's cost of capital. The greater the difference in the relative correlations the higher the potential improvement in shareholder value from hedging.

The impact on the cost of debt is more complex. The most significant impact is through the firm's exposure to default risk. If currency transactions are significant and the foreign currency is highly correlated with the domestic currency then the impact is unlikely to be significant and the gains from hedging modest. Where the degree of correlation is low or indeed negative then eliminating currency risk may significantly alter the firm's default risk. However, unlike market risk default risk is related to the overall volatility of a firm's underlying value and its ability to finance its debt. The elimination of currency risk is therefore likely to have at least some impact on the volatility of the firm's cash flows and therefore its cost of capital.

**4 Saturn Systems**

Note: regulatory regimes with respect to takeovers vary between different jurisdictions and in answering this question the examiners will wish to see evidence that candidates are either (a) aware of the regulations or codes within their own countries or (b) are familiar with the UK's City Code for Takeovers and Mergers.

**Memorandum**

**To: John Moon**

**From: Conny Date**

**Potential Bid for Pluto Ltd**

The remarks made at the dinner last night whilst general in nature and non-specific about this firm's intentions could be construed as an intention to bid for Pluto Ltd. Below are the principal regulatory, financial and ethical issues we currently face:

## Regulatory issues

Most regulatory regimes around the world impose strict rules concerning the release of price sensitive information such as an intention to bid. Furthermore, as directors of a publicly quoted company we are obliged to take all reasonable care that any information we put into the public domain does not mislead investors. In Singapore for example, the Singapore Code on Take-overs and Mergers stresses the vital importance of absolute secrecy before any announcement is made. The Code places the burden of secrecy upon anybody in possession of confidential information, particularly where the information is price sensitive, and it stresses that they should conduct themselves so as to minimise the risk of any accidental disclosure.

When a target company is a particular subject of rumour, speculation or untoward movement in its share price, and where it is reasonable to assume that the source was the offeror, then the Code stipulates that an announcement of intention should be made.

An announcement that we do not intend to bid, or are withdrawing a bid, normally means that we are restricted from making another bid within a specified time period (normally six months) unless:

- an offer to be made by us is recommended by the board of Pluto to its shareholders,
- another offer is made by a third party,
- a whitewash proposal is made by the board of Pluto or,
- there is a significant change of circumstances such as the regulator is disposed to waive the requirement.

The underpinning requirement here is that in our public announcements we have a duty to be as clear as possible, not to be seen as creating a false market in the shares of Pluto Ltd and providing all shareholders (both our own and those of Pluto) with equal access to information about our intentions.

## Financial issues

The comments made by you might not have been interpreted as significant by the market under different circumstances. However, the 15% price movement strongly suggests that the market now views Pluto as a target and Saturn as one of a number of potential predators. Evidence accumulated on the reaction of the market to information entering the public domain – the so called reaction studies of the semi-strong form of the Efficient Markets Hypothesis – confirms that the market has a powerful ability to anticipate announcements and it is no surprise that the market recognises the potential of the situation with respect to Pluto. The sudden price increase strongly suggests that we are now seen as potential bidders. The problems that we face are three fold: first, we are not yet in a position to announce a formal bid in that we have undertaken neither a due diligence study of Pluto nor have we undertaken a valuation of the company, second the price range over which we can negotiate has now been raised and third, if we withdraw we cannot make a further bid within six months.

The valuation of Pluto will not be straightforward. Our preliminary view is that although the company is part of our supply chain it may not carry our exposure to business risk. We have entered into preliminary discussions with our investment bankers about raising the necessary debt finance. The size of the acquisition means that it is most likely that we will alter both our exposure to business and financial risk. This means that the value of Pluto to us cannot be determined independently of a revaluation of our existing business on the presumption that the acquisition proceeds. The increase in the valuation of Saturn would determine the maximum that we should be willing to pay without impacting adversely upon our own shareholder value.

## Ethical issues

One possibility is to deny that we are considering a bid for Pluto. The distinction we need to note here is whether our current investigations could be classed as 'strategic scanning' or we are actively considering this company as a bid target. The major difficulty we have is that Pluto is one of four companies discussed at the May board meeting as a potential target and although that discussion was very speculative investors will be aware that we have consistently sought growth through acquisition rather than organically. Given these circumstances and the commitment of this company to adopt the highest standards of ethical conduct with respect to transparency and the treatment of investors I recommend that we clarify our position.

## Recommendation

I therefore recommend that following consultation with the regulator we make an announcement as follows:

*Following recent speculation, the Board of Saturn Ltd confirms that it is considering a possible combination with Pluto Ltd. However, the Board has decided not to make an offer at this time. The Board reserves its right to make an offer or take any other action which might otherwise be restricted under the six month rule in the event of (a) an agreement from the Board of Pluto, (b) an announcement by any other party of a possible or actual offer, (c) a whitewash proposal from the board of Pluto Ltd or (d) significant change in circumstances.*

Given this announcement we will still have the opportunity to develop a bid proposal and to enter into substantive negotiations with the board of Pluto. However, we will not be able to make a hostile bid in the absence of another company making a bid for Pluto.

## 5 Neptune

- (a) The adjusted present value technique separates the value created by the Galileo project into two components: (a) the value of the project cash flows at the firm's pure rate of equity (i.e., the unlevered WACC), and (b) the gain or loss of value associated with the costs and benefits of the new finance.

The adjusted present value method is only appropriate where the project does not affect the firm's exposure to business risk. With the Galileo project we can estimate the alteration to the firm's cash flows as a whole if the project were to proceed. This adjustment entails a substantial tax benefit because of writing down allowances but also a delayed tax charge attributable to the increase in the firm's taxable earnings generated by the project.



The project cash flows exclude all non-relevant costs but include the opportunity costs associated with the redeployment of labour. The projected relevant cash flows and the calculation on the eventual profit on the sale of the capital equipment are as follows:

	0	1	2	3	4	5
Sales revenue		680.00	900.00	900.00	750.00	320.00
Direct costs		-408.00	-540.00	-540.00	-450.00	-192.00
Redeployment of labour		-150.00	-150.00			
operating cash flow		122.00	210.00	360.00	300.00	128.00
capital payments and receipts	-800.00					40.00
less written down value						31.00
profit on sale of equipment						8.90

On the basis of this the net of tax operating cash flows and the tax savings attributable to the write-off for tax purposes of the capital equipment are:

	0	1	2	3	4	5	6
operating cash flow		122.00	210.00	360.00	300.00	128.00	
tax on operating cash flows			-36.00	-63.00	-108.00	-90.00	-38.40
capital cash flow	-800.00					40.00	
capital allowance saving		120.00	48.00	28.80	17.28	10.37	6.22
sale of capital equipment							-2.67
nominal project cash flow	-800.00	242.00	221.40	325.80	209.28	88.37	-34.85

The valuation of this future cash flow involves the firm's cost of capital on the basis that it is ungeared (the pure equity rate). The calculation of the ungeared rate is shown in note 1.

Using the ungeared rate of 8.97% to discount the project cash flows and LIBOR plus the firm's credit spread (7.2%) to discount the tax benefit associated with the project an adjusted present value is estimated at \$100.69 million as follows:

	0	1	2	3	4	5	6
nominal project cash flow	-800.00	242.00	221.40	325.80	209.28	88.37	-34.85
discount at pure equity rate	-800.00	222.07	186.44	251.76	148.41	57.50	-20.81
Net present value of post tax operating flow	45.38						
new capital introduced	-816.32						
tax saving on annual interest		17.63	17.63	17.63	17.63	17.63	
discounted value of tax shield on interest	71.63	15.87	15.06	14.29	13.56	12.86	
Cost of financing	-16.32						
Adjusted present value	100.69						

Note: it is assumed that there is no tax relief on debt.

This suggests that the new project will add substantial value to the firm although \$71.63 million is attributable to the tax benefit associated with the new financing less 2% transaction cost associated with the new debt finance. With this project the clear advice on the basis of the financial analysis is to proceed although it is worth bearing in mind that more marginal projects may be solely justified through the financing effect.

- (b) The modified internal rate of return (MIRR) is calculated using the rate of return required to discount those cash flows as follows:

One procedure for calculating the MIRR is to calculate the terminal value of the cash flows from the recovery phase of the project using the company's cost of capital of 8.97%.

	0	1	2	3	4	5	6
nominal project cash flow	-800.00	242.00	221.40	325.80	209.28	88.37	-34.85
compound factor using 8.97%		1.5365	1.4100	1.2940	1.1874	1.0897	1.0000
terminal cash flow		371.83	312.18	421.57	248.51	96.29	-34.85
future value of recovery cash flows	1,415.54						

The modified internal rate of return is found by calculating the internal rate of return of the modified project cash flow:

$$-800 + \frac{1,415.54}{(1 + MIRR)^6} = 0$$

Therefore:

$$MIRR = \sqrt[6]{\frac{1,415.54}{800}} - 1 = 9.98\%$$

An alternative approach is as follows:

$$MIRR = [1 + PI]^{\frac{1}{n}} \times (1 + rate) - 1$$

where PI is the profitability index or the net present value of the project's operating cash flows divided by the capital invested.

In this case, because we are concerned solely with the project's nominal cash flow excluding financing costs we use the ungeared cost of equity as the appropriate discount and reinvestment rate.

$$MIRR = \left[ 1 + \frac{45.38}{800} \right]^{\frac{1}{6}} \times (1.0897) - 1 = 9.98\%$$

It is to be expected that in a highly competitive business new business opportunities with significant net present values are hard to find. This project, if successful, will add to the value of the firm and offers a rate of return just 1% higher than the current reinvestment rate.

#### Note 1

Below we show the required elements of the estimate of the pure equity rate deducted from the firm's current, tax adjusted market gearing.

The current market gearing  $w_d$  is:

$$w_d = \frac{2,500}{7,500 + 2,500} = 0.25$$

The tax adjusted market gearing using a company tax rate of 30% is:

$$w_d' = \frac{2,500 \times 0.7}{7,500 + 2,500 \times 0.7} = 0.1892$$

Given a beta of 1.4 this implies an ungeared (or asset) beta of:

$$\beta_A = \beta_E(1 - w_d') = 1.4 \times (1 - 0.1892) = 1.1351$$

The cost of equity capital (ungeared) is found as follows:

$$r_e = 0.05 + 1.1351 \times 0.035 = 0.0897 \text{ (8.97\%)}$$

**Tutorial note:** *These model answers are considerably longer and more detailed than would be expected from any candidate in the examination. They should be used as a guide to the form, style and technical standard (but not in length) of answer that candidates should aim to achieve. However, these answers may not include all valid points mentioned by a candidate – credit will be given to candidates mentioning such points.*

*Professional marks are awarded for the quality of the layout, clarity and persuasiveness of the presentation and integration of analytical data with the written text.*

		<b>Marks</b>
<b>1</b>	<b>(a)</b> Calculate the tax adjusted gearing for Jupiter and the FS sector	2
	Calculate the proxy asset beta for Mercury and its estimated equity beta	4
	Estimate Mercury's equity cost of capital and WACC	2
	Note of circumstances under which each is used	2
	<b>Total 10</b>	<b>10</b>
<b>(b)</b>	Lowest rate set at liquidated value of the business	2
	Calculation of reinvestment rate and growth	3
	Estimation of upper boundary price per share	3
	Identification of control premium	2
	<b>Total 10</b>	<b>10</b>
<b>(c)</b>	Advantages and disadvantages of listing (regulatory, takeover, process)	4
	Nature of PE finance and its advantages and disadvantages	4
<b>Total 8</b>		<b>8</b>
<b>2</b>	Note candidates may answer this question in a variety of ways and in different order to that set. Up to two marks are awarded for the professional quality of the report.	
<b>(a)</b>	Identification of the principal causes of failure (revenue, cost, asset, liability or capital management (one mark for each))	5
	<b>Total 5</b>	<b>5</b>
<b>(b)</b>	Assessment of the performance of the business and its prospects	2
	Assessment of the efficiency of the business	2
	Assessment of the general risk exposure	2
	Assessment of the risk of default	4
	Assessment of the liquidity of the business	2
	Calculation of operating cash cycle	3
	Conclusion with respect to proposed plan of action	2
	<b>Total 17</b>	<b>17</b>
<b>(c)</b>	Role of the board and duty to stakeholders	2
	Role of good internal control and risk management	2
	Response of the board to potential acquisitions	2
<b>Total 6</b>		<b>6</b>
<b>(d)</b>	Professional marks	4
<b>Total 4</b>		<b>4</b>

		Marks
<b>3</b>	<b>(a)</b> Calculation of forward rates	4
	Calculation of minimum rate at LIBOR + 7 through reverse money market hedge	5
	Conclusion	1
		<u>10</u>
<b>Total 10</b>		
<b>(b)</b>	Advantages and disadvantages of OTC versus ET derivatives	
	Basis risk	2
	Under/over hedging	1
	Counterparty risk	1
	Flexibility	1
	Margin	1
		<u>6</u>
<b>Total 6</b>		
<b>(c)</b>	Impact upon the cost of equity capital	2
	Impact upon cost of debt capital	2
		<u>4</u>
<b>Total 4</b>		
<b>4</b>	<b>(a)</b> Identification of the problems created by Mr Moon's remarks	3
	Significance of the price reaction	3
	The firm's current position and identification of the holding option on the PR	4
	Ethical problems of insider information, fairness to stakeholders, avoidance of dissembling	5
		<u>15</u>
<b>Total 15</b>		
<b>(b)</b>	Issue of immediate press release	2
	Draft of statement reserving the company's position under six month rule	3
		<u>5</u>
<b>Total 5</b>		
<b>5</b>	<b>(a)</b> Note of the two approaches to Adjusted Present Value	2
	Projection of relevant cash flows	4
	Identification and calculation of appropriate discount rates	4
	Calculation of value of project and tax shield using APV	4
		<u>14</u>
<b>Total 14</b>		
<b>(b)</b>	Calculation of MIRR using 8.97% as reinvestment rate	6
		<u>6</u>
<b>Total 6</b>		