INSTITUTE OF ACTUARIES OF AUSTRALIA

COURSE 1 INVESTMENTS NOVEMBER 2006 EXAMINATIONS

MARKING GUIDE

Level of Difficulty

Question	Units	Knowledge & Understanding	Straight-forward Judgement	Complex Judgement	Total Marks
1a	1	1			1
1b	1	1	1		2
1c	1	1	1		2
1d	1		1	1	2
1e	2			2	2
1f	2	2			2
1g	2	2			2
1h	2	1	1	3	5
1i	2			2	2
2a	2	1	1		2
2b	2	1	1		2
2c	2		2	2	4
2d	2		1	3	4
2e	2	2	1	1	4
2f	2		2	2	4
3a	4	2	2		4
3b	4	1	1		2
3c	4		2	4	6
3d	4	2	2		4
3e	4		2	2	4
4a	5	2			2
4b	5	2	3	2	7
4c	5	2	3	2	7
4d	5, 6	2	1	1	4
5a	6	1		2	3
5b	6	1	2		3
5c	6	1	2		3
5d	6		2	3	5
5e	6			3	3
5f	6,3	2		1	3
TOTAL		**30**	**34**	**36**	**100**

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Answer all 5 questions.

QUESTION 1 (20 Marks)

The stability of world financial markets in recent years is reflected in low interest rates relative to historical levels, coupled with strong GDP growth. In its 2006 *Financial Stability Review*, the Reserve Bank comments:

> **"Notwithstanding these favourable outcomes, there continue to be a number of puzzles regarding the pricing of risk in the financial system. In global capital markets these include the persistence of low long-term bond yields and compressed credit risk premiums. Both these phenomena reflect, in part, the *ex ante* excess global supply of saving over investment and an associated 'search for yield'. They also reflect an apparent optimism by investors that inflation will remain low and economic conditions will remain generally stable."**

(a) Discuss in what sense interest rates may be regarded as historically low. (1 mark)

(b) Suggest reasons why interest rates may be presently low. (2 marks)

(c) Suggest reasons why credit risk premiums may be presently low. (2 marks)

(d) Discuss in broad terms the effect that low interest rates may have on investment strategy. (2 marks)

(e) Are there any concerns that you would raise with the effects you identify in (c)? (2 marks)

At a particular time, the par yield curve and the spot curve for Commonwealth Government securities have the following shapes:

	Yield p.a. convertible semi annually									
maturity (years)	1	2	3	4	5	6	7	8	9	10
Par yield	3.27%	3.87%	4.32%	4.81%	5.26%	5.53%	5.70%	5.80%	5.85%	5.86%
spot	3.30%	3.93%	4.42%	4.95%	5.45%	5.76%	5.95%	6.06%	6.10%	6.10%

(f) Suggest possible reasons for the shape of the curves. (2 marks)

(g) Describe briefly the general relationship between the par yield and spot yield curves. (2 marks)

(h) Calculate the 1-year forward rates implied by the above for terms 1, 2…9 years and suggest possible reasons for the shape. (5 marks)

(i) *Assuming no short term movement in the yield curves*, suggest possible strategies you would consider to exploit your analysis in (h). (2 marks)

Solution

(a) 'Low' in relation to GDP growth. The "Golden Rule" of monetary policy suggests that long term interest rates and GDP growth should be equal in the long term.

(b) Possible reasons for low interest rates:

- low/controlled price inflation by central banks generally (including the RBA)
- more savings than investment (supply of capital exceeds demand)
- loose monetary policy as economic stimulus
- matching of pension liabilities in US and UK (under the international accounting standards, employers have tended to immunise their pension liabilities using long dated bonds, thereby increasing the demand, and reducing the yields available, for this asset class).

(c) Possible reasons for low credit premiums:

- Strong corporate earnings mitigates credit risks generally.
- Demand for corporate debt exceeds supply – sovereign debt is much diminished and government budget surpluses.

(d) Possible outcomes

- Seek asset classes with higher returns
- may result in erosion of risk premiums
- demand for alternative investments and less creditworthy bonds
- growth of leveraged investments
- Competition between lenders and erosion of bank margins.

(e) Concerns with unsustainably low interest rates:

- Housing prices cannot be sustained at high levels, with high levels of mortgages
- Economic/social instability could ensue in households with correction to interest rates.
- There are adverse implications of the above for household consumption and spending, and thus for economic growth. Many industries in equity markets would thus be impacted.
- Pensioners and retirees receive an unjustifiably low level of retirement income, which therefore has to be subsidised in other ways.

(f) The curves have an apparently normal upward/flattening shape:

- Expectations theory – future rates will generally rise
- Liquidity premium – longer bonds have greater risk and therefore attract higher yield
- Convexity bias – longer bonds have more upside, mitigates liquidity premium

(g) The spot yields s_n relate to ZCBs and can be used to price any bond as approximately:

$$P = g\sum_{1}^{n}(1+s_t)^{-t} + 100(1+s_n)^{-n}$$

where g is the coupon on the bond (convertible half yearly) and n is the number of years to maturity. Alternatively the coupon g can be derived from this relationship for a bond standing at par $P = 100$, to give the par yield curve.

(h) One year forward rates can be derived from the relationship:

$$1 + f_n = \frac{(1+s_{n+1})^{n+1}}{(1+s_n)^n}$$

to give the following:

Term	1	2	3	4	5	6	7	8	9
Forward rates	4.56%	5.40%	6.58%	7.48%	7.33%	7.08%	6.78%	6.45%	6.09%

This gives a clear market indication that rates are expected to rise over the next 5 years, and then fall gradually. Possible reasons are as follows:

- Current economic growth is unsustainable and interest rates must increase in the short term
- Short term inflationary influences (eg oil)
- Investor demand is at short or long end of the yield curve, with few liabilities to be matched in the medium term.

(i) If the objective is to seek the highest return on debt investment (rather than to outperform a benchmark) the idea is to gain interest rate exposure in the 3-5 year duration range, eg:

- Invest long and sell short
- Long 10 year futures and short 5 year futures
- Swap floating for fixed in the 5 year range.

QUESTION 2 **(20 Marks)**

You are establishing a company to purchase and operate a VHF television licence in a well developed economy. Your financial advisers have adopted a Discounted Cash Flow (DCF) model for valuing the licences, applying a discount rate representing the opportunity cost of capital. This compensates investors for the time preference of receiving income sooner rather than later. The cost of capital for a particular project is the minimum expected rate of return on an investment required by the providers of debt or equity for that particular project.

The weighted average return required by the providers of debt and equity is the Weighted Average Cost of Capital (WACC). The conventional specification of WACC is:

$$WACC = R_d(1 - T_c)\frac{D}{V} + R_e\frac{E}{V}$$

where:

R_d **is the cost of debt, before taxes. For the purposes of our calculations, we have calculated the cost of debt, based upon a sound credit rating and a conservative 150 basis point spread over and above the yield on a 5 year bond.**

T_c **is the corporate tax rate.**

D **is the market value of (interest bearing) debt. We have reviewed the level of gearing D/V for our sample of international companies and historically. Our sample produced a mean market gearing figure of 41%.**

V **is the market value of the firm, *D+E***

R_e **is the cost of equity.**

E **is the market value of equity.**

Within this specification of WACC, the cost of equity is specified under the Capital Asset Pricing Model (CAPM) as:

$$R_e = R_f(1 - T_i) + \beta_e.PTERP$$

where:

R_f **is the risk free rate of interest. The typical financial instrument to use for an assessment of the risk free rate is a long-dated government bond. Conceptually, the maturity of the selected government bond should match the maturity of the investment or calculation under consideration**

T_i **is the investor tax rate. A comprehensive analysis of the mix of investors in the market and their tax status has been made. From this, we have derived an average investor tax rate estimate of 28%.**

β_e is the equity beta. Drivers of the equity beta are the asset beta and gearing. An equity beta is a measure of the relationship between movements in a company's share price and movements in a share market index. It is used as a measure of the relative degree of risk associated with investment in a particular company. Equity betas encompass the effects of financial risk as well as operating risk, while asset betas only incorporate the effects of operating risk (i.e. the riskiness of the business itself). Asset betas β_a are independent of financing, and the relationship between equity and asset betas is $\beta_e = \beta_a\left(1+\frac{D}{E}\right)$.

$PTERP$ is the expected post tax equity risk premium. Our estimate for the ERP input is based on extensive research on government bond yields, investor tax rates, and equity market returns (comprising dividends, imputation credits and capital gains). The data set covers several decades extending back to 1926. Based on this data, the research has in recent years provided a point estimate for the ERP in the range of 7.5% to 8.0%.

Derivation of Discount Rates

The parameters underlying the WACC, as explained above, may be assessed at the present time as follows:

Component	
Government 5 year bond rate	6.3%
Post Tax Equity Risk Premium	8.0%
Debt Margin	1.5%
Investor Tax Rate	28%
Corporate Tax Rate	30%
Asset Beta	0.63
Debt / (Debt + Equity)	41%
Equity Beta	1.06
Cost of Debt	7.8%
Cost of Equity	13.0%
WACC estimate	9.9%

(a) Explain the rationale for the use of the WACC as a discount rate for valuing the television licence. (2 marks)

(b) Discuss the version of the CAPM that has been applied to assess the return on equity. (2 marks)

(c) Suggest reasons why two forms of beta (asset beta and equity beta) have been considered in the analysis, and explain the relationship between the two. (4 marks)

(d) Discuss the appropriateness of the derivation of the PTERP. (4 marks)

(e) Describe fully how you would expect the resulting WACC to be applied in assessing a value for a television licence on the basis of its projected cash flows, indicating any difficulties that you may encounter in practice. (4 marks)

(f) Suggest alternative approaches of valuation that circumvent the difficulties you identify in (e). (4 marks)

Solution

(a) Rationale:

- Each venture must have a particular return to equity and debt, weighted proportionately
- The returns should be after the venture's tax position (but before the investor's)

(b) The version of CAPM that is used is conventional, but allows for the investor's tax position. However it appears that the company is a tax paying entity, so it would be more appropriate to allow for the venture's tax position rather than the individual investor's. In any case, it may not be possible to know the tax position of individual investors.

(c) It is likely that only equity betas have been observed and measured for TV licences, all with different debt levels. Where a company finances the purchase of a licence by a specific level of debt, then an asset beta can be determined in the following way.

The CAPM relationship for the equity beta is:

$$R_e = R_f + \beta_e\left(ERP - R_f\right)$$

Therefore the return resulting from the whole asset, financed by holding E of equity and D of debt is:

$$\begin{aligned} R_a &= \frac{E}{V}\left[R_f + \beta_e\left(ERP - R_f\right)\right] + \frac{D}{V}R_f \\ &= R_f + \frac{E}{V}\beta_e\left(ERP - R_f\right) \end{aligned}$$

Hence the asset beta $\beta_a = \frac{E}{V}\beta_e$. This can now be combined with the company's desired debt level to assess an equity beta that is specific to that company.

(d) The assessment of post tax ERP is evidently based on historical data, particularly historical equity performance. This approach assumes that:

- ERPs are fairly stationary over time;

- Equity performance, relative to debt, from time to time is explained solely by the ERP and not by other systematic factors (eg. commodity prices; monetary policy).

Both these assumptions are questionable, especially in the distant past where different economic conditions prevailed (eg. lack of monetary restraint during the depression).

One adjustment that can be made to historical ERP is to allow for the current pricing level, relative to a sustainable PE level. However the most suitable approach would be to apply an economic theory which explains the ERP.

(e) The purpose of the WACC is to provide a risk-adjusted discount rate for valuing expected future cash flows from the TV licence. These cash flows would comprise:

- Revenue (eg advertising)
- Production costs
- Tax payments

After tax cash flows must be used as the WACC is assessed on an after tax basis. Financing costs do not figure in the valuation, as the WACC allows for the cost of debt.

It is likely that the tax position of the venture will be complex, involving an interaction between the financing and the operational aspects of the venture (i.e. the debt financing will be structured to be tax effective).

In addition the revenue may be very hard to project, being dependent on the popularity of program content.

(f) A simpler valuation approach may be to use a cost of equity for valuing cash flows after financing costs (i.e. equity cash flows). This may allow the specific debt financing structure to be allowed for.

Nonetheless, the problem of projecting revenue is the most difficult one. This could be based on the experience of similar TV licences, allowing for the issue of a new TV licence (and limited viewer demand). A PE multiple would be the simplest valuation approach under these circumstances.

QUESTION 3 **(20 Marks)**

You are an adviser in the infrastructure development section of an investment bank, which has been approached by a developing country to provide financing for its water supply.

The financier must agree on a plan for suitable dams and infrastructure, and to meet the costs of its construction. In return the financier will be given the right to charge for water usage in perpetuity at an agreed maximum price, once storage levels have reached a particular level. However there are severe penalties for undersupply.

Preliminary studies have indicated that:

- **There are several suitable sites for dams, each with a distinctive catchment area.**
- **For each possible site, the rates of water inflow and its distribution according to season have been assessed.**
- **Construction costs for each dam have also been assessed, as well as ongoing operational costs.**
- **The demand for water, according to season and to price, has also been modelled statistically.**

The financier suggests that its task may be approached as an asset-liability model, where the dams are the 'asset classes', each with a distinctive distribution of water inflow that provides revenue. The 'liabilities' arise from the demand for water at a particular price.

(a) Explain how the financier's asset-liability modelling for the proposed development differs from conventional asset-liability modelling. (4 marks)

(b) From the viewpoint of the country's water regulator, explain why the price charged by the financier must be subject to a cap. (2 marks)

(c) Suggest possible investment objectives and constraints for the financier (either mathematically or in words). (6 marks)

(d) Describe broadly the process you would adopt to assess whether the investment objectives are met by a given configuration of dams and water price. (4 marks)

(e) Discuss how you would approach the pricing of water when the scheme is operational. (4 marks)

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Solution

(a) In conventional asset models, returns are assumed to follow a distribution which has a well determined dynamics and covariance structure. The dynamics may be based on serial correlation of returns or their volatilities (or on the lack thereof). In contrast, rainfall has no obvious dynamic structure, but is clearly subject to seasonality, which is more predictable. There is also a covariance structure for the rainfall in different locations in any given season.

The financier's task differs from a conventional asset-liability model in that he must plan both the scale and type of construction to meet water demand. In addition, the financier has the control of price to regulate demand to some extent.

(b) The demand for water is not sensitive to price beyond a certain level, so that a cap on price is required to prevent excessive monopoly profits on the part of the financier. This is justifiable on both social and political grounds (as with the age pension safety net).

(c) The financier is faced with a choice of construction sites for dams d, each with a known construction cost C_d, and operational costs $M_d(t)$. Each dam has a stochastic inflow of water $Y_d(t)$ according to season t, and the demand for water $X(t, p)$ for a given price p .It is not a trivial exercise to find an optimal long term water price; in general the higher the price, the lower the demand (which is the whole point of charging for water). A trade-off has to be struck between the amount of water sold and what price is charged for it.

The financier's task might therefore be to maximise the expected present value of profit:

$$\sum_t E\left[pX(t, p) - M_d(t)\right]e^{-rt} - \sum_d \alpha_d C_d$$

where r is a discount rate appropriate to the financier's cost of capital. The control variables are the weights given to dams α_d and a sustainable water price p .

Subsidiary objectives might include the volatility of profit as above, or a return on capital.

This has to be subject to the constraint that total water storage does not become negative with any significant probability:

$$pr\left[V_0 + \sum_{t=0}^{T}\left(\sum_d \alpha_d Y_d(t) - X(t, p)\right) < 0\right] < \varepsilon$$

The penalties associated with low or negative water storage could also be reflected in the financier's profit objective above.

Thus the financier is faced with an issue familiar to insurers: the need to avoid ruin, or depletion of reserves. In practice there will be other constraints on the weights α_d as neither water supply nor construction cost will be in proportion to scale.

Lastly, the financier may have limited access to capital, which may provide a ceiling to the capital invested $\sum_d \alpha_d C_d$

(d) Since the variables affecting the financier's profit are all modelled stochastically, the easiest way of assessing the project is by long term simulation. This would involve for different dam configurations:

- Simulations of water flow and water accumulation
- Covariance of water flow between dams
- Simulations of water usage
- Projected revenues
- Testing of simulations to see how often the volume constraint is violated.

In addition, it would be prudent for the financier to assess the extent of penalties resulting from undersupply, and to provide for such costs in assessing profit.

(e) Once the scheme is operational, the financier faces a similar but shorter term optimisation problem: to adopt a pricing policy which reflects both current storage levels, as well as seasonal demand for water.

Such a policy would be viable if storage levels were high, and reducing price may increase demand. This can be modelled as a price schedule $p(V,t)$. However this problem is more complex than that in (d), because it relies on finding a functional form for price, rather than an absolute level.

An approach might be as follows:

- Assess an optimal distribution of storage levels according to season;

- Impose a constraint that storage levels at the end of the 12 month period should not deviate too greatly from the optimal;

- For a given storage level and season, determine the price to maximise the monopoly profit as set out in (d) for the chosen dam configuration, over a 12 month period and subject to the above constraint.

QUESTION 4 **(20 Marks)**

You are the CFO of a trustee for a large retail superannuation fund which offers a range of investment options to its members. You have been asked by the Board to rationalise the fund's investment structure. Two structures are being canvassed:

(i) Retention of the existing structure, under which a particular investment manager is appointed to manage each investment option. Mandates are given to both balanced and specialist managers.

(ii) A new structure under which all investments are managed by an *implemented consultant* under a multi-manager, multi style arrangement. The consultant would be responsible for the selection of specialist managers and the allocation of funds to each manager.

(a) Describe how investment options might be designed under structure (ii). (2 marks)

(b) Discuss the relative strengths of the two structures. (7 marks)

(c) Discuss the relative weaknesses of the two structures and how they may be mitigated in practice. (7 marks)

(d) Discuss what performance benchmarks you would recommend, and how you would report the performance achieved under the two structures. (4 marks)

Solution

(a) Investment choices could be created by allocation of funds to one or more of the appointed managers. The consultant would therefore need to design the asset allocation strategy for each choice in consultation with the trustee, and the pricing of each choice would be linked to that of the underlying assets.

(b) The existing structure has the following strengths:

- Each manager is wholly responsible for one or more choices, and can in theory adopt a holistic approach to managing assets.
- The fund does not need to be involved in asset allocation, and hence in-house expertise can be limited to manager selection.
- The pricing of the choices follows that of the manager's invested assets.

The alternative structure has the following strengths:

- The expertise of one specialist manager can be exploited across one or all of the choices;

- A particular choice can be supported by several managers with complementary styles;
- The consultant is responsible for the selection and monitoring of specialist managers, which is presumably his greatest value add;
- The consultant is responsible for asset allocation of each choice and across the fund as a whole, so there should be less opportunity for 'implementation leakage' i.e. lack of coordination between specialist managers.

[Many other points are possible and should be credited appropriately. They may revolve around the issues of flexibility; adaptability; accessibility to the manager universe; control and accountability, or lack thereof; professional conflicts.]

(c) The existing structure suffers from several weaknesses:

- Asset class performance within the various choices can be widely divergent. This means that a member must decide not only asset composition but also manager style. [This may be mitigated by having the same manager provide similar investment options.]
- It may be difficult to replace an existing manager with one of a similar style or skill
- It is difficult to introduce investment in new asset classes except by creating further choices. [This may be mitigated by employing multi-skilled managers.]
- There may well be lack of coordination in the activities of separate managers, resulting in high transaction costs and tax expense. [This is known as 'implementation leakage' and could be mitigated, at some cost, by having a single custodial function.]

The alternative structure also suffers weaknesses:

- There is an additional layer of management costs.
- The trustee would have to take a greater role in asset allocation and the design of choices.
- There may be conflicts of interest involved in having the implemented consultant act also as an investment adviser.

[See (b) for other types of points that should be credited.]

(d) Under the existing structure, it is a simple matter of reporting each manager's performance for each choice. A strategic asset allocation, with published indexes for each asset class, could be used as a benchmark. For balanced managers, performance can be attributed in the usual way to asset allocation and stock selection.

For the alternative structure, both the managers and the consultant have a role to play in delivering performance. Hence it would be reasonable to adopt as a benchmark a strategic asset allocation, and average specialist manager performance for each asset class:

- Specialist managers should be able to explain their performance in terms of sectoral allocation and stock selection;

- The consultant must be able to attribute the performance on each choice to his decisions on asset allocation and manager selection.

QUESTION 5 **(20 Marks)**

You are the investment officer of a large superannuation fund that employs specialist active managers for most asset classes. One of your responsibilities is the reporting of managers' quarterly performance to the trustee Board. This is benchmarked against the appropriate indexes.

A member of the Board has suggested that tax should be taken into account in the quarterly performance reporting. Your research of the issue has provided two alternative approaches to assessing after tax performance:

Conventional approach

$$After\ tax\ return = \frac{1}{APV}\left[(UCG + RCG)\times\left(1-\frac{2}{3}t_s\right)+\left(OI+\frac{FD_A}{1-t_c}\right)\times(1-t_s)\right]$$

where:

- RCG **is realised capital gains**
- UCG **is unrealised capital gains**
- FD_A **is franked dividends**
- OI **is income other than franked dividends**
- t_c **is the corporate tax rate applicable to franked dividends**
- t_s **is the superannuation tax rate of 15%**
- APV **is the average portfolio value (based on fund accounts, with provision for tax on *UCG*).**

AIMR Approach

The performance standards of the *Association of Investment Management and Research* propose an alternative approach

$$After\ tax\ return = \frac{1}{\overline{APV}}\left[UCG + RCG\times\left(1-\frac{2}{3}t_s\right)+\left(OI+\frac{FD_A}{1-t_c}\right)\times(1-t_s)\right]$$

where

- $\overline{APV}$ **is the average portfolio value (based on fund accounts, without provision for tax on *UCG*).**

(a) Discuss the factors that would affect the Board's preference for reporting after-tax, as opposed to before-tax, returns. (3 marks)

(b) Explain the rationale of the conventional approach to after tax performance. (3 marks)

(c) Explain the rationale of the AIMR approach to after tax performance and in what circumstances it would be meaningful. (3 marks)

(d) Discuss the benefits and limitations of the two approaches in assessing overall fund performance or a manager's performance. (5 marks)

(e) Suggest how some limitations of the AIMR approach may be overcome in practice. (3 marks)

(f) Discuss how the profit/loss from derivatives should be accounted for under the two approaches, and whether derivative strategies should depend on the approach adopted. (3 marks)

Solution

(a) There are several purposes for reporting investment performance:

- Information to members in respect of their benefit entitlements (or the funding of their entitlements).
- Monitoring of managers' operations.
- Monitoring of asset allocation strategy.

For the first and last of these purposes, it is the after-tax performance that is relevant, as members receive an after-tax return, and those responsible for asset allocation must have regard to after-tax returns. However managers should be assessed on an after-tax basis only if their mandate includes a specific provision to manage the tax position of the investments under management.

This would require a decision by the trustee Board to decentralise the management of the fund's tax position. In the situation where two or more managers operate in the same asset class, this may require a further division of responsibilities.

(b) The conventional approach to after tax performance is based on:

- Provision for tax on UCG in both asset values and income.
- Provision for tax on RCG and all other taxable income, after allowing for franking credits.
- Australian dividends being assessable together with their attached franking credits (the purpose of the gross up) as this is the income that a company has earned.

For both UCG and RCG, the tax rate is at 2/3rd of the usual rate for investments held more than 12 months. This means, in effect, that the portfolio of investments is sold at the beginning of the measurement period, and again at the end, in assessing performance.

(c) In contrast the AIMR approach assumes that:

- There is no tax on UCG, or they are indefinitely deferred.
- Tax is incurred as a cost only when it becomes payable, i.e. on income received and realised gains.

The first assumption might be justified in the case of a passive manager, who realises assets only to rebalance against an index. It may also be justified in the case of an active manager who is benchmarked against a passive index.

(d) The merits of the conventional approach are as follows:

- Provision for tax on UCG is in accordance with accounting standards, and is thus readily explainable.
- There is no distinction made between UCG and RCG, which is easier to handle from an accounting viewpoint.
- There is incentive given to the manager to capture all available franking credits.

However:

- Since the assumption is made that the portfolio is liquidated at both the start and end of the period (for tax purposes), the after tax performance will depend on the period taken for measurement. For example, compounding of after tax returns for 2 six-month periods does not produce the same after tax-tax return for a 12 month period.
- There is no tax disincentive provided to an active manager to realise gains, as they are treated the same as UCG.

The merits of the AIMR approach are as follows:

- Since assets are not assumed to be sold at the end of each measurement period, it is possible to chain the returns for consecutive periods.
- For a passive manager, with minimal stock turnover, the lack of provision for tax on UCG is closer to reality than the conventional approach.
- An active manager is given an incentive to allow for tax in trading: the return on a stock realised and reinvested must overcome the hurdle of bringing forward the tax on RCG. That is, the task of managing the fund's tax position is partly delegated to managers.

However:

- The AIMR approach penalises managers who are forced to realise assets, as a result of cash flow or portfolio restructuring.
- It may be hard to explain why UCG should not attract a tax provision.

(e) The most serious issue with the AIMR approach is the assumption that all trading activity is at the discretion of the manager. This can be allowed for by excluding from the after tax return the effect of tax on RCG which are beyond the manager's control.

A further issue is the assumption that no tax on UCG will ever be payable. This can be dealt with in several ways. It may be appropriate to apply the AIMR approach for manager assessment only, with overall fund performance assessed on the conventional approach. Or it may be appropriate to apply a discounted tax rate for UCG, on the basis of an expected holding period for assets as may be agreed with the manager.

(f) Movements in the market value of derivative contracts for a term less than 12 months (the usual situation) should be accounted for as taxable income, without the capital gains discount.

It is reasonable that derivative strategies used for hedging should take into account the tax position of the assets. Under the conventional approach, it is the value after provision for tax on capital gains that is to be hedged; whereas under the AIMR approach it is the value before tax. The choice is ultimately whether the trustee is concerned with before tax or after tax performance.

END OF SOLUTIONS