THE INSTITUTE OF ACTUARIES OF AUSTRALIA

INVESTMENT MANAGEMENT **2001 EXAMINATIONS**
PAPER TWO

Answer all 7 Questions

QUESTION 1 **(9 Marks)**

You are an asset consultant, with multiple superannuation fund clients under advice.

a) You have previously advised a client to invest 100% with Manager C based on Manager C's claim to limit its' tracking error to 6% and the client's desire to invest in a "relatively low risk manager". He is furious that the latest figures he has seen (which are reproduced above) show that the manager has the third highest tracking error and it is in excess of 6% p.a.

Draft your reply using information included in Table A below. (4 marks)

Table A. Performance Survey

	3 Months to 31/03/01		1 YR TO 31/03/01		3 YRS TO 31/03/01	
Manager/Fund	**Standard Deviation**	**Tracking Error**	**Standard Deviation**	**Tracking Error**	**Standard Deviation**	**Tracking Error**
	(%pa)	**(%pa)**	**(%pa)**	**(%pa)**	**(%pa)**	**(%pa)**
Manager A	17.4	15.5	12.2	8.3	15.6	11.9
Manager B	14.4	12.0	10.5	11.1	14.0	10.3
Manager C	10.6	8.4	9.8	6.3	11.1	5.0
Manager D	14.2	5.4	11.1	3.6	12.8	5.2
Manager E	12.7	5.0	13.6	3.8	12.9	3.9
Manager F	12.7	5.0	11.0	2.8	12.8	4.8
Manager G	11.6	4.4	11.4	3.7	11.8	5.1
Manager H	10.9	4.4	9.7	3.2	10.7	3.9
Manager I	12.0	4.4	10.4	2.9	11.3	2.8
Manager J	11.8	4.1	13.5	2.8	12.2	3.7
Manager K	12.9	3.8	11.6	3.3	11.8	3.3
Manager M	13.4	3.4	12.9	2.8	12.5	3.2
Manager N	11.9	3.0	10.4	2.5	11.3	3.0
Manager O	12.8	2.7	11.7	2.3	12.2	2.5
Manager Q	10.0	2.5	10.5	2.8	10.3	2.5
Manager R	12.1	2.5	12.2	2.4	11.9	2.3
Manager T	12.3	2.3	10.8	2.7	11.8	2.6
Manager U	11.9	1.9	10.9	3.5	11.3	3.0
Manager V	12.2	1.8	11.8	2.5	12.0	2.4

NB: All calculations have been based on monthly return figures

b) You have decided to move 50% of the client's money to another manager, with the aim of minimising the tracking error of the combined portfolio. What additional statistic would you require to do this? (2 marks)

c) What impact do you think this would have on the information ratio of the combined portfolio (going forwards), and why? (3 marks)

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QUESTION 2 **(9 Marks)**

A large super fund is planning to split its international equity exposure between four managers. Three alternative ways of doing this have been proposed:

1. Four global managers with different styles, namely one large cap growth, one large cap value, one small cap growth, and one tactical asset allocation specialist
2. Four regional managers covering North America, Europe, Japan and Emerging markets
3. Four sector specialists, namely Technology/ Capital goods, Consumer goods/Pharmaceuticals, Resources and Financials

Discuss the merits of each alternative, focusing in each case on the potential for the total portfolio to outperform its global index benchmark (Salomon Brothers Broad Market Index ($A)).

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QUESTION 3 **(10 Marks)**

a) You are an actuary with clients who are superannuation trustees. One of your trustee clients has asked you to help find a buyer for a large parcel of shares in a life insurance company to which their fund has become entitled through a recent demutualisation. You would receive a commission of 0.5%. Explain with reasons what circumstances would need to apply to you to be able to advise on this:

i. under Corporation Law
ii. under the Institute of Actuaries Professional Standards and Guidance Notes

(5 marks)

b) Assuming you are able to advise clients on the share offering referred to in Part a), explain how you would identify other clients whose investment arrangements might indicate an interest in purchase of these shares and the allocations they might be able to make to them.

(3 marks)

c) You are another actuary who has been contacted by the actuary in Part a) to see if any of your clients may be interested in purchase of the shares. What circumstances need to apply for you to be exempted from adviser and dealer licensing under ASIC Policy Statement 120 if you refer one of your clients to the other actuary?

(2 marks)

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QUESTION 4 **(16 Marks)**

An Australian superannuation fund has $2 billion in assets. Members' benefits are determined each year as: opening balance, plus contributions less expenses, plus interest at the rate earned on the Fund's assets.

The Trustee of the Fund has made a decision to move from the current strategy (which has 15% of assets invested internationally) to a new strategy with 50% of assets invested internationally, as follows:

	Current	**New**
Australian Shares	45%	25%
International Shares	15%	25%
Australian Listed Property	10%	5%
International Listed Property	-	5%
Hedge Fund	-	10%
Total "Growth" Assets	**70%**	**70%**
Australian Fixed Interest	25%	15%
International Fixed Interest	-	10%
Australian Cash	5%	5%
Total "Income" Assets	**30%**	**30%**

The international listed property exposure is to be gained by investing exclusively in US Real Estate Investment Trusts. The Hedge Fund exposure is to be gained by investing in a single hedge fund managed in the US.

a) The Fund's Trustee Board has approached you to provide advice concerning the level of currency hedging that is appropriate in the long term. They have told you that they are concerned about the timing of the change, given that at the time of the change the Australian Dollar has recently traded at US51c. In particular they are concerned about underperforming their "peer group" of funds if the Australian dollar strengthens. This "peer group" typically invest 20%-25% of assets internationally, the majority of which is unhedged.

The Trustee Board have asked you to write to them outlining what level of currency hedging is appropriate overall and in particular which of the asset classes outlined above should be hedged back into Australian dollars.

Draft the letter to the Trustee; if necessary indicate any further analysis that you would wish to perform or extra information that you would require. (11 marks)

Question 4 continues over page

b) The Hedge Fund in which the Fund intends to invest has the following characteristics:

- ability to short sell stocks to up to 100% of the value of investors' funds
- ability to use investors' funds and the proceeds from short sales to invest in stocks to up to 200% of the value of investors' funds.
- investable universe (for both short and long positions) is US and European telecommunications, media and technology stocks
- fees are equal to 20% of the outperformance of the Hedge Fund over the returns from USD cash (calculated and payable quarterly in arrears). There is no requirement for underperformance in previous periods to be made up before the fee is payable. There is no base fee.

Outline with reasons whether you believe the 10% allocation to this Hedge Fund is appropriate. (5 marks)

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QUESTION 5 **(13 Marks)**

ShareEx Limited operates a securities exchange providing electronic transaction and listing services for trading Australian equities, warrants and other Australian equity derivatives. Companies currently listed on the exchange are mainly smaller, newly listed companies, and many operate in the technology sector.

Part of the transaction fee levied by ShareEx on trades that are made through the exchange is retained in a Reserve Fund. This Reserve Fund has been established to provide compensation to investors using the exchange in the event of stockbroker insolvency or fraud, or failure of a stockbroker to deliver securities after settlement. The assets of the Reserve Fund are currently on deposit with a major Australian bank.

The Directors of ShareEx Limited wish to improve the investment returns on the Reserve Fund and have asked you as a consulting actuary for advice in reviewing the Fund's strategic asset allocation to achieve this objective.

To assist in the assignment, the Directors have provided you a copy of a report from another actuary on an investigation into the expected liabilities of the Reserve Fund. This report looked at past compensation claims experience and analysed the sensitivity of Fund liabilities to a range of factors including trading volume and the underwriting activities of stock brokers.

a) You decide that you will develop an asset liability model to assist with the analysis required for your report to the Directors. Draft the section of your report that explains what is meant by asset liability modelling and the rationale for using it in this case. (3 marks)

b) Describe the key characteristics of the asset liability model you would propose for this project, the assumptions that will be required, an explanation of the output your model will produce and how this will be used in making your recommendations. (6 marks)

c) One Director suggests investing the Reserve Fund in the shares of companies that are about to launch an initial public offer (IPO) and list on the exchange. The Director argues that since share prices of companies increase following their IPO, the improved investment returns would assist in increasing the size of the Reserve Fund, therefore providing greater protection for investors using the exchange. The Director also suggests that this strategy would increase trading activity in these newly-listed companies, which would raise more levies for the Reserve Fund.

   Draft your response to the Director's proposal stating why you would or would not support such a strategy. (4 marks)

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QUESTION 6 **(20 Marks)**

You are the quantitative analyst at Wallaby Equity Investment Management (WEIM). WEIM's active quantitative Australian equity fund has a tracking error of around 2%pa. WEIM's active quantitative equity fund has a turnover of around 120%pa.

You are currently looking to enhance WEIM's active return factor labelled "Earnings Revision". "Earnings Revision" seeks to quantify to what extent broking analysts are revising their earnings expectations for any one stock.

a) What is the theory behind the use of "Earnings Revision" as an active return factor? (4 marks)

b) What are some of the many ways that an "Earnings Revision" factor can be measured? Can some of these measures be combined to produce a "Super" Earnings Revision factor? (5 marks)

c) How would you get the information to measure these factors, and which one is the preferred approach, and why? (3 marks)

d) Your CEO states to you that active quantitative funds tend to have very high turnover with resultant costs such as market impact costs and capital gains tax implications. Discuss this statement, and in that discussion, point out how you can alter the way that Earnings Revision is measured to help to reduce the turnover. (3 marks)

e) You have decided that you would like to test a few of the possible Earnings Revision factors that you have devised. Explain a simple backtest that you can apply, based on the quintiles of a single factor, to see how these various measures performed historically. Explain the key limitations of this "single factor" test. (5 marks)

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QUESTION 7 (23 Marks)

You are the fund manager for an insurance portfolio in run-off. The current valuation date is 31 December 2000. The actuary has given you an estimate of the liability payments, as shown in Table 1 below. You may assume that the payments in each year are paid in the middle of the year.

Table 1 – Projected Liability Payments

Year	Payment ($m)
1	30
2	22
3	17
4	12
5	5

The Macaulay duration of these liability cashflows is 1.707 years and the convexity is 5.404 years.

You have available to you the following Commonwealth Government Bonds to invest in.

Table 2 – Commonwealth Government Bonds

Coupon rate	Maturity date	Yield	Price	Duration	Convexity
11%	30-Jun-01	5.00%	108.325	a	0.680
7%	30-Jun-02	5.50%	105.558	1.435	b
6%	30-Jun-03	6.00%	102.956	2.332	7.142
5%	30-Jun-04	6.25%	98.638	3.214	12.522
4%	30-Jun-05	6.45%	92.656	4.103	19.401

Table 3 – Spot rates of interest

Term to maturity	Spot rate
0.5	5.00%
1.5	5.51%
2.5	6.03%
3.5	c
4.5	6.49%

These bonds pay annual coupons. The yield to redemption assumes an annual compounding period. The bonds will be redeemed at their face value. The duration shown is the Macaulay duration, not the modified duration.

a) Complete Tables 2 and 3 above by calculating the missing values a, b and c. Calculate c to the nearest 0.01%. Calculate the other values to 3 decimal places.

(3 marks)

Question 7 continues over page

Question 7 continued

b) Using the bonds maturing in 2001 and 2005 only (i.e. bonds 1 and 5 above), use Redington immunisation to construct a portfolio which is protected against small interest rate movements. (5 marks)

c) Construct a cash-flow matched portfolio using all bonds available. What do you notice about the value of this portfolio compared to the value of the portfolio in part b)? (6 marks)

d) List and comment on the features of these two approaches to minimising interest rate risk that should be considered before implementing them in practice.

(5 marks)

e) Describe how you would protect the solvency of the fund against interest rate fluctuations if you were provided with an estimate of the distribution of payments in the future, where some payments are functions of interest rates.

(4 marks)

END PAPER TWO

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