THE INSTITUTE OF ACTUARIES OF AUSTRALIA

INVESTMENT MANAGEMENT **1998 EXAMINATIONS**
SPECIALIST LEVEL PAPER ONE

Answer all 5 Questions

QUESTION 1 **(14 MARKS)**

a) Describe, with reasons, the asset portfolio that best matches the liability in each of the following cases.

(i) A mortgage insurance portfolio where the liability payments have an expected term of 3 years and are strongly correlated to interest rates (e.g. a 3% increase in mortgage interest rates might typically double the loss ratio for this portfolio, thus increasing the liabilities). (3 marks)

(ii) The Policy Liability of participating life insurance business which is equal to the market value of supporting assets. (1 mark)

b) Describe, with reasons, the asset portfolio that best matches the liability in each of the following cases. What practical problems would be faced in managing the asset portfolio to match the liabilities?

(i) A portfolio of CPI-indexed life annuities. (5 marks)

(ii) A single premium equity-linked insurance bond with a minimum guaranteed return applying at all times. (5 marks)

THE INSTITUTE OF ACTUARIES OF AUSTRALIA

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QUESTION 2 **(17 MARKS)**

You are a fixed interest fund manager, and the junior analyst has submitted some research to you, which can be summarised as follows :

> "The following time series model has been fitted to daily 10 year bond yields over the past 10 months :
>
> $$X_t = -0.007\% + 0.1X_{t-1} - 0.2X_{t-2} - 0.05X_{t-3} + 0.01X_{t-4} + x_t$$
> *where* :
> $X_t = Y_t - Y_{t-1}$
> $Y_t =$ Yield on day t, *and*
> x_t is white noise.
>
> Using this model, a forecast has been made over the next 4 weeks, which shows 10 year bond yields rising by 0.01% over the next few days, and thereafter remaining within a 0.15% range over the remainder of the forecast period. I therefore conclude that bond yields should be quite range-bound over the next 4 weeks."

a) What type of time series model has the analyst used ? (1 mark)

b) If you expected yields to trade within a range, what (non-derivative) trading strategy should you adopt to profit from this view ? (1 mark)

c) What option strategy could you put in place to profit from this view, while limiting the potential for loss in the event that your view is incorrect. (2 marks)

d) Draw the pay-off diagram for your strategy. (1 mark)

e) Without reference to the analysts conclusions, critically analyse the analysts approach to modelling the yield. Do you think it is likely that there are any shortcomings in the model produced ? Discuss. (7 marks)

f) Critically analyse the analysts interpretation of the model. Discuss whether the analyst's conclusions are sound. (5 marks)

THE INSTITUTE OF ACTUARIES OF AUSTRALIA

INVESTMENT MANAGEMENT **1998 EXAMINATIONS**
SPECIALIST LEVEL PAPER ONE

QUESTION 3 **(18 MARKS)**

You have been asked to specify the parameters for the mean and variance of return for an asset model as part of an asset liability study for a superannuation fund. This model requires assumptions of the expected returns and standard deviation of various asset classes, as well as the correlations of the asset returns with inflation and with each other.

The superannuation fund currently invests in both direct property and listed property trusts. You are required to specify the parameters for both asset classes.

a) Explain why the return profiles of listed and unlisted property assets within the fund may differ, and why listed property sometimes displays characteristics more similar to equities or bonds than direct property. (10 marks)

b) What difficulties are faced when modelling direct property returns for an asset liability study, using historical information as a starting point. Suggest possible ways of overcoming these difficulties. (8 marks)

THE INSTITUTE OF ACTUARIES OF AUSTRALIA

INVESTMENT MANAGEMENT **1998 EXAMINATIONS**
SPECIALIST LEVEL PAPER ONE

QUESTION 4 **(23 MARKS)**

You are the manager of BFM, a large balanced fund which competes against several large balanced funds.

In the budget later this month, you expect the Commonwealth Government to announce an extensive privatisation program which should lead to substantial budget surpluses for the next five to ten years — after several years of balanced or deficit budgets. You believe the extent of the privatisation program and the size of projected surplus will be well beyond market expectations.

a) Explain what you would expect to happen to the relative amounts of Australian equities on issue and Australian fixed interest on issue over the next five to ten years. (3 marks)

b) Discuss the possible implications (if any) for :

(i) Active asset allocation for BFM over the remainder of this month. (4 marks)

(ii) Neutral asset allocation for BFM over the next five to ten years. (4 marks)

c) You now wish to appoint an external specialist manager to passively manage BFM's exposure to Australian fixed interest. A mandate has been drafted for your consideration, which includes the following :

- The benchmark is the Warburg Dillon Read Australian Composite Bond Index (formerly known as the "SBC Warburg Composite Bond Index").

- Allowable investments are :

  - Cash
  - Bank accepted bills and negotiable certificates of deposit with maturities up to 1 year for banks rated >= A-1+(Standard & Poors)
  - Commonwealth Government treasury notes and fixed interest securities
  - Semi Government fixed interest securities rated >= AA- (Standard & Poors)
  - SFE traded interest rate and bond futures

Question 4 continues over page

Question 4 continued

- The duration constraint is : benchmark duration +/- 1 year

- The remuneration is based on a fixed fee of 0.10% p.a. plus an incentive bonus equal to 1/20th the return in excess of the benchmark, (under-performance results in a reduction of the fixed fee equal to 1/20th the return shortfall against the benchmark). The remuneration is paid annually in arrears. A zero fee (following substantial under-performance in any one year) will be sufficient grounds for immediate removal of the manager.

Comment on the suitability of this mandate, and suggest possible changes.

(12 marks)

THE INSTITUTE OF ACTUARIES OF AUSTRALIA

INVESTMENT MANAGEMENT **1998 EXAMINATIONS**
SPECIALIST LEVEL PAPER ONE

QUESTION 5 **(28 MARKS)**

You are an equity analyst who has been asked to value two companies: Company A and Company B. The following page contains summarised information from their latest annual reports**. Note that students will not be expected to perform detailed calculations to answer this question.**

a) What adjustments would you make to the total profit figures to calculate maintainable earnings ? (9 marks)

b) What additional information would you require ? (5 marks)

c) How might you detemine a PE ratio (or ratios), and how might you use the PE ratio (or ratios) to value these companies? (8 marks)

d) What methods other than using PE ratios may you use to value these companies ? (6 marks)

THE INSTITUTE OF ACTUARIES OF AUSTRALIA

INVESTMENT MANAGEMENT **1998 EXAMINATIONS**
SPECIALIST LEVEL PAPER ONE

Comparison of two financial groups :

HOLDING COMPANY SEGMENT RESULTS (AFTER-TAX) $ million	**Company A** Full year ended 30-Jun-98	**Company B** Full year ended 30-Jun-98
Domestic Life Insurance Business		
- Operating profit*	50	50
- Return on shareholders funds	200	10
Sub-total	**250**	**60**
Domestic Banking Business		
- Operating profit (pre-tax, after-goodwill, after provisions)	90	
- Tax expense	-10	
Sub-total	**80**	
Funds Management Business		**30**
Offshore Life Insurance Business		
- Operating profit*		30
- Return on shareholders funds		10
- Currency translation gain (loss)		-30
Sub-total		**10**
Profit from asset sales	**75**	
Dividends received from investments (after-tax)	**5**	
TOTAL PROFIT (AFTER-TAX, PRE-PREFS)	**410**	**100**
Converting prefernce share dividend	-10	n/a
TOTAL PROFIT (AFTER-TAX, AFTER-PREFS)	**400**	**100**
* Includes planned profit margin, experience profit, capitalised losses, and reversals		

ADDITIONAL INFORMATION		
Shareholder funds of domestic life insurance business	**1,000**	**1,000**
Shareholder funds of bank	**500**	
- comprising net tangible assets	*400*	
- comprising goodwill	*100*	
Shareholder funds of offshore life insurance business		**650**
Market Value of investments	**200**	
Shareholder funds of funds management business		**50**
Total Shareholder Funds	**1,700**	**1,700**
External funds under management (non-life business)		**5,000**
Goodwill amortisation charge in bank	**10**	
Number of Ordinary Shares	2.0 billion	2.0 billion
Number of Converting Preference Shares (Face value $5m)**	20 million	
** Convert into ordinary shares in 3 years at the share price at that time (expected to be $2)		

END OF PAPER ONE