THE INSTITUTE OF ACTUARIES OF AUSTRALIA

INVESTMENT MANAGEMENT **1999 EXAMINATIONS**
PAPER ONE

Answer all 5 Questions

QUESTION 1 **(15 Marks)**

(a) Explain how the gearing of a company is likely to affect the beta of its ordinary shares. (3 marks)

(b) Assume that an equity fund manager has sold a 3-month at-the-money straddle on Share Price Index futures. What are the two main risks with this strategy over the following week? (2 marks)

(c) Explain how the closing of a defined benefit lump sum superannuation fund to new entrants alters the investment policy most suitable for the fund.

(3 marks)

(d) You are an analyst for a global equity fund manager who has the opportunity to purchase one of two portfolios consisting entirely of emerging markets assets. You have been asked to estimate which fund you believe to be more diversified. State, with reasons, the factors you would take into consideration when comparing the diversification of the two funds. (7 marks)

QUESTION 2 **(17 Marks)**

At the start of a month, a portfolio consisted of the following physical assets:

Asset class	Market Value ($AUD million)
Physical equities	50
Cash	20
Fixed interest	30

In addition, there was also an options position on Share Price Index futures, the details of which are:

- 500 3-month call options, each with a strike of 3050.
- Each call option is quoted at 40 points. The contract size for the SPI Futures Contract is $25 x the All Ordinaries Index (in points)
- The option delta is 0.35.

The physical equities form a well-diversified portfolio designed to replicate the All Ordinaries Index, with "value added" by tilting the portfolio at the discretion of the manager.

Index values at the start of the month were:

All Ordinaries Index	2,990
All Ordinaries Accumulation Index	10,000
Share Price Index Futures	3,000

(a) Calculate the market value of the options. (2 marks)

(b) Calculate the effective exposure to the three asset classes. (5 marks)

Question 2 continues over page

Question 2 continued

(c) Over the next month, there were no cash-flows into or out of the fund. All dividends were immediately reinvested in physical equities, and all coupon payments and maturities were immediately reinvested in the fixed interest portfolio. The option position was held throughout the month.

- Cash returned 0.40% over the month
- The fixed interest portfolio returned 1.00% over the month.
- Active management of the physical equities portfolio added value of 0.25% to the equity return.
- The quoted price of each call option has increased to 55 points, and the delta has increased to 0.5.

Index values at the end of the month were:

All Ordinaries Index	3,040
All Ordinaries Accumulation Index	10,190
Share Price Index Futures	3,040

(i) Calculate the % return on the portfolio over the month. (6 marks)

(ii) Calculate the % return on the portfolio's equity exposure over the month. For the purposes of this question, you may assume that any changes in exposure resulting from the option position occurred at the end of the month. (4 marks)

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QUESTION 3 **(20 Marks)**

You are the Chief Financial Officer of XYZ Ltd. As part of its business, XYZ has incurred a contractual obligation to make fixed payments of $10,000,000 every 6 months over the next 5 years. The first payment will be in 6 months' time.

The Managing Director has been told that Redington's approach to immunisation might be appropriate for managing assets to support these liabilities.

(a) Draft a letter to the Managing Director explaining the concept of Redington's approach to immunisation. (6 marks)

(b) You have calculated the following values for the liabilities :

Present Value	$85 million
Modified duration	2.55

Construct a portfolio from the assets below which will immunise the liabilities, based on Redington's approach.

Term to maturity (Years)	Coupon	Price per $100 face value	Modified duration
2	8.0%	105	1.82
2.75	6.0%	101	2.47
3	6.5%	102	2.69
9	11.0%	122	6.06

All of the assets are issued by the Commonwealth Government. You are permitted to select only two assets. (8 marks)

(c) Assuming that the portfolio determined in part (b) is chosen to immunise the liabilities, what are the risks involved in the immunisation strategy.

(3 marks)

Question 3 continues over page

Question 3 continued

(d) Each six months you will be required to prepare a report demonstrating how the value of the assets has changed compared to the value of liabilities. Assets will be valued at Commonwealth Government yields. Discuss how you could value the liabilities in a manner consistent with the asset valuation.

(3 marks)

QUESTION 4 **(24 Marks)**

(a) Who are the participants in:

- setting strategic (benchmark) asset allocation; and
- managing tactical (active) asset allocation ?

Explain their roles. (4 marks)

(b) You are a member of an asset allocation committee for ABCFM, a fund manager that advertises itself as a balanced investor of superannuation funds.

ABCFM invests in the following assets:

- Australian equities
- Overseas equities
- Australian fixed interest
- Overseas fixed interest
- Australian direct property
- Australian indexed bonds
- Australian cash

Currently, ABCFM has no formal strategic allocation. A senior member of the committee has only recently learned about "Markowitz optimisation" and "efficient frontiers", and has suggested that the asset allocation committee:

- Determine a strategic asset allocation for its standard balanced fund.
- Determine the strategic asset allocation using a mean-variance optimisation model.
- Determine the inputs of the model directly using historical data from the 25 years to 30 June 1999.
- Use the model to maximise expected returns given a standard deviation equal to the average standard deviation over the 12 years to 30 June 1999, for a group of managers that ABCFM considers its competitors.

Draft a report to the committee on the merits of this suggestion. Highlight any problems in the suggested approach, and suggest possible modifications.

(20 marks)

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QUESTION 5 **(24 Marks)**

You are an actuary in an asset-consulting firm, which has been contracted to provide advice on a proposed index for the Australian interest rate market, to be used by domestic fund managers. You have been presented with a draft proposal for your consideration. The features of this proposal are summarised below.

- The index is a single broad index of the Australian interest-rate market, which includes nominal bonds, inflation indexed bonds and floating rate notes. Both nominal and floating-rate asset-backed securities (such as mortgage-backed securities) are included. To be included, a security must have a minimum face value on issue of AUD50 million.
- Returns will include both income and capital gains. The index return is determined by the market-value weighting of the returns of all securities in the index. The market value of each issue is calculated as (total price per $1m face value) x (face value on issue)/ $1m.
- The security pricing is an amalgam of price makers' rates, collected after the close of trading each day and published the following morning.
- All Commonwealth Government and Semi Government debt issues are automatically included in the index. Other changes to the index composition are determined by a committee of industry representatives – and there are no specific restrictions regarding either minimum credit ratings or on private placements. All changes are announced at the start of the business day with immediate effect.

(a) What are the risk characteristics and return characteristics of Commonwealth Government capital indexed bonds compared to Commonwealth Government nominal bonds? (5 marks)

(b) Comment on the suitability of this index, and suggest improvements.

(14 marks)

(c) Discuss what the differences should be between an Australian index designed to be used by domestic interest rate fund managers, and an Australian index designed to be part of a global bond index, to be used by overseas interest rate fund managers. (5 marks)

END PAPER ONE