INSTITUTE OF ACTUARIES OF AUSTRALIA

INVESTMENT MANAGEMENT **2004 EXAMINATIONS**
PAPER ONE

Answer all 6 questions.

QUESTION 1 **(9 Marks)**

You are the consultant responsible for advising on the investment strategy of a closed defined benefit scheme. The scheme provides for both lump sum and pension benefits. In recent years, pension liabilities have increased significantly in proportion to total liabilities and now represent 50% of total liabilities. The trustees have adopted one investment strategy for the defined benefit scheme. The current strategy is detailed in the table below.

Class	**Allocation (%)**
Australian shares	25
International shares	20
Listed property	15
Australian bonds	15
Inflation linked bonds	20
Cash	5
Total	**100**

(a) Comment on the current strategy of the scheme and the suitability of the allocations. (3 marks)

(b) One of the trustees has suggested that you consider income-generating assets for the scheme, given the significance of pension liabilities. In light of the observations in (a) and given the comments by the trustee, recommend any changes (if any) you would make to the investment strategy and identify any issues you would need to highlight with respect to each change. (4 marks)

(c) It has been brought to your attention that the pension benefits include reversionary pensions, making the term of the liabilities longer than what you initially anticipated. Comment on how this may influence your advice in part (b). (2 marks)

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QUESTION 2 **(24 Marks)**

You work in the product development team of a large Australian bank. About nine months ago, the bank launched a reverse mortgage product after some consultation with your department. The main features of this product are as follows:

- The product is available to persons who are 65 years old or older who own their own home.

- Purchasers of this product (borrowers) enter into a loan and receive a payment from the bank, taken as either a lump sum, a stream of smaller payments, or both. This payment is commonly used for daily living expenses, home repairs, medical bills and travel.

- The main features of the loan are as follows:

  - The maximum amount that can be drawn down by borrowers is a function of their age and is based on a sliding scale. For 65-69 year olds, it is 25% of the value of their home. For 80+ year olds the proportion is 35%.

  - Interest is accrued monthly at the following rate:

    = Residential Borrowing Rate + 1.0% pa.

  - Fees include an establishment fee, a biennial property valuation fee and a monthly loan service fee. The latter two fees are payable in advance.

  - Repayment takes place on the first of a) the sale of the home, b) the borrower moving out of their home, or c) the borrower dying (in the case of a couple, when the last remaining borrower dies).

  - Generally, the loan will be repaid from sale of the home. If the proceeds of this sale do not meet the loan balance, the bank wears the loss. Any excess on sale of the home over the loan balance is repaid to borrowers or their specified associates.

  - Alternatively, the borrowers or their associates can repay the loan directly, in which case the home need not be sold.

  - There are no penalties for early repayment (either in part or in full).

The product was marketed as a way for senior citizens to “tap into the equity of their own home” to either enhance or preserve their quality of life and maintain their independence.

(a) List the advantages and disadvantages of such a product to borrowers. (3 marks)

(b) From the bank's perspective:

(ii) List the advantages of such a product. (1 mark)

(iii) List the disadvantages (or risks) of such a product and state, with reasons, which you consider to be the most important. (4 marks)

Recently, new players have entered the reverse mortgage market and allow a larger amount to be borrowed for effectively the same rate as that charged by your bank. The reason for this is that the initial launch of your product was rushed. As a consequence, the product was conservatively designed. The little testing that was done rationalised that the adopted interest rate, along with the relatively low borrowing limits, would suffice to cover the entire risk of the product.

The bank is now worried that if the product is not made more competitive, market share will be lost. Your manager, the head of product development, has also pointed out to you that, at present, no reserve for risk is set aside. Instead, the bank realises all profit on a cash flow basis. Within the bank, you have close acquaintances in the quantitative arm of the risk management department. They can provide you with simulated Bank Bill Swap (BBSW) rates and property appreciation rates from the bank's sophisticated risk management engine.

(c) Draft a discussion paper for the bank that addresses the above mentioned concerns and, specifically, takes into account the following:

- The different approaches you could take.
- How you would apply a model (if any).
- The broad features of any modelling you might undertake.
- The type of sensitivity testing that you might undertake in order to assist in making a decision on adequate methods of risk control.
- The type of risk management measures that might be implemented.

(Hint: consider product optimisation as a resolution between offering the highest possible loan to home value and ensuring a positive risk management outcome.) (16 marks)

QUESTION 3 **(18 Marks)**

Having recently passed your final actuarial exam you have been promoted to manage the asset liability function for Rock Solid Australian Life Company (a newly publicly listed company on the ASX).

On your first day in the position, your manager (who is not an actuary) calls you into his office for an urgent meeting. Apparently those annoying investment analysts have been questioning the earnings guidance given by senior management and the share price of Rock Solid has been under pressure. As such, your manager is keen to improve profitability. However, he emphatically states that "if they sack any more people, I'm going to have to make my own coffee". Consequently, cost cutting is not an option.

After some thought, your manager has come up with a 'great idea'. Clearly the margins earned on the annuity portfolio are far too low, and the opposition are selling significantly more volume than we are because we are not at the top of the league tables. So, why back annuities with bonds and earn small margins, when you can back them with equities and improve margins instantly, even after increasing returns for customers (which will presumably sell more product). Clearly lifetime annuities represent long term liabilities and as such you should back them with a long term asset such as equities. After all, some competitors are using property to back annuities! Furthermore, your manager reminds you that the company broker has said that equities look like good value now.

Your manager demands a report for the board by tomorrow to support the idea – there is an analyst briefing and it would be very handy to give them some good news for a change.

(a) Set out a covering letter to your manager on your initial thoughts about his 'great idea', including the merits of such actions, the consequences (short and long term), the positives and negatives, and your responsibilities as an actuary. (10 marks)

(b) Set out the process you would undertake to support your views with hard data, how you would go about determining the inputs, modelling the key variables to be studied, scenarios to be tested, final output and any other factors you think important to consider. (8 marks)

QUESTION 4 **(19 Marks)**

You have recently been appointed as the asset consultant to the Trustee Board of an endowment trust that awards scholarships to talented actuarial students. Until recently, the trust was solely focused on scholarships to students attending Australian universities, and all assets were conservatively invested in short term Australian bonds.

A recent contribution from a wealthy Asian based structured finance actuary has expanded the potential activities of the trust immensely. The charter of the trust is now being extended to provide for scholarships to selected undergraduate students across the entire Asia Pacific Region.

The aim is that each scholarship should fund the selected student's full tuition costs, plus a modest living allowance to enable them to pursue their studies.

The current assets of the trust are now of the order of A$120million. The intention is to have a steady state of 200 students on scholarship at any one time, each receiving an annual scholarship of A$30,000 (indexed to CPI inflation). Once a student is awarded a scholarship, they are guaranteed this funding for the duration of a 4-year actuarial education, subject to satisfactory performance in their studies.

The Trustee has come to you for advice as to how they might change the configuration of the trust in light of their changed circumstances, and has raised the possibility of seeking a full asset-liability study.

(a) Discuss the key issues that you would need to consider as part of a broad asset-liability investigation for the trust. In your answer you should outline any further information you would request from the Trustee about the trust and its proposed activities. (8 marks)

(b) What are the issues involved with investing the trust in a combination of Australian, Asian and global **bond** managers? In your answer you should discuss your recommended portfolio structure, including the allocations to Australian and global bonds, nominal or inflation linked securities, active or passive approaches, government or credit rated securities. You should also discuss how you would select a bond manager and what sources of value added you would pursue. (6 marks)

(c) How would your answer to (b) change if the trust invested in a combination of Australian, Asian and global **equity** managers? (5 marks)

QUESTION 5 **(22 Marks)**

You are the asset consultant to a superannuation fund of a large Australian company (XYZ) which is listed on the Australian Stock Exchange. The assets invested by the Fund are greater than $2 billion and the fund has in excess of 10,000 members. The Fund has historically offered defined benefits and accumulation accounts with interest style crediting rates and limited investment choice. Investment options offered to members have been branded "XYZ Super Fund" conservative and "XYZ Super Fund" balanced options. The Fund has been administered by a small team of staff employed by the company.

The company has decided to upgrade the features of the fund to include a competitive range of investment options with well recognised brand names to enable members to implement their own investment strategies. These investment options are detailed in the table below.

Provider	**Type of Option Provided**
Citibloc	Australian Socially Responsible Shares
MAP Hinderson	Balanced Growth
Imperial First State	High Growth
Credit Sheesh	Cash
Merry Lynch	Overseas Shares
Flaming-Green Abbott	Balanced Pooled Super Trust

(a) For each of the options recommended in the table above, suggest, with reasons, appropriate benchmarks to apply in reviewing performance.

(6 marks)

(b) Disparities between the performance of the options and underlying benchmarks will need to be explained to members and their advisers. Write a report to the Trustee covering the points detailed below:

- Identify sources of tracking error that the Trustee should be concerned about.
- Which of these sources are the responsibility of the Trustee and why is it important to minimise these?
- How can the Trustee minimise tracking error from these sources?
- Which of these sources are the responsibility of the fund manager and why is it important to manage these?
- How do fund managers manage tracking error from these sources?

(10 marks)

(c) One of the Trustees is very concerned about press reports from the US about the late trading and market timing scandal.

(i) Explain what is meant by late trading and market timing and the impact this activity could have on members. (2 marks)

(ii) How can the Trustee ensure that these activities do not occur in this fund?

(2 marks)

(iii) Using a simple example, explain how the use of buy sell margins can reduce tracking error and reduce the incentive to engage in late trading.

(2 marks)

QUESTION 6 **(8 Marks)**

You work as a risk management specialist with an understanding of the issues impacting investment markets. A listed property trust (LPT) manager has approached you in this capacity. The manager is looking to secure a deal in which a third party buys approximately $0.5 billion of LPT shares. However, this purchase will also involve the provision of a Revenue Guarantee by the manager in which the initial capital value of the shares is guaranteed in 10 years time.

The LPT manager has requested that you estimate the premium to be charged to the third party for the provision of the Revenue Guarantee. The manager has also requested that you use Monte Carlo simulation and expects the use of a Black-Scholes approach or a variation on this.

You mention this exercise to a friend of yours who works as an independent consulting actuary in the area of derivatives and derivative transactions. She informs you that this exercise is unusual and there are unlikely to be any players in the market who are capable of providing rigorous advice in this area. She goes on to say that, due to the lengthy term of the contract (10 years), rigorous advice is likely to be spurious. She has agreed to undertake the options modelling work.

(a) Outline the broad nature of the transaction which the LPT manager is hoping to implement. (1 mark)

(b) Elaborate on the 'spurious' nature of any advice as indicated by your consulting actuary colleague in the context of a Black-Scholes framework. Suggest a broad approach that you might take given these drawbacks. (3 marks)

(c) You speak to the manager in relation to the points you have outlined in part (b) above. They are aware of these weaknesses and point out that this was the reason why they constrained your fees for this exercise. They are keen for you to approach the task in the fashion that they originally recommended.

You have been assigned the task of setting assumptions for key parameters. Detail these key parameters and any particular considerations you will need to make in setting these. (4 marks)

END OF PAPER ONE

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