INSTITUTE OF ACTUARIES OF AUSTRALIA

COURSE 2A LIFE INSURANCE **MAY 2007 EXAMINATIONS**

QUESTION 1 **(17 Marks)**

You are the appointed actuary of Risk Management Mutual (RMM), a medium sized Australian life insurance company specialising in risk products. RMM launched its first trauma product in 2001. The trauma rates used in the original pricing basis were based on the results from the IAAust Lump Sum Experience Investigation 1998-99. There are 43,486 policies in force for this product at the most recent valuation date.

You have recommended to RMM's Management Team that the morbidity experience for the trauma block of business be investigated, and it has been agreed that the work be done by one of the recent graduates who have joined RMM.

The nominated graduate is an actuarial student with no practical involvement so far in experience investigations, but has passed all of the Part I actuarial subjects, including those covering statistics, life tables and exposed to risk calculations.

To ensure the work is carried out in accordance with your requirements, as well as to document the process, you have agreed to provide the graduate with instructions.

a) Draft a memo to the graduate, outlining clearly the main steps in the experience investigation that you expect the graduate to follow, from obtaining requirements to producing the results. (7 marks)

b) In the following table the graduate has compared RMM's experience to the corresponding trauma results included in the IAAust Lump Sum Experience Investigation 1998-99. Describe the main features of these results from the point of view of RMM. (6 marks)

Curtate Duration	Ratio (%) of actual to expected claims by curtate duration.			
	Males		Females	
	IAAust 1998-99	RMM 2001-06	IAAust 1998-99	RMM 2001-06
0	53	65	68	78
1	66	70	67	76
2	62	63	68	74
3	59	61	84	68
4	58	61	61	65
5 – 9	54		67	
10 +	75		53	
5 +	55 (6)		66 (9)	
2 +	59 (3)	62 (45)	70 (4)	71 (68)

Notes:

- Estimated standard errors are shown in parentheses.
- The same (population) incidence basis has been used throughout this table to calculate expected claim numbers.

c) Explain the implications of these results for the profitability and re-pricing of the company's product. (4 marks)

QUESTION 2 **(15 Marks)**

You are a product actuary at Aussie Life Re (ALR), a life reinsurance company that operates in Australia.

Emu Life (Emu) is a medium sized life insurer, writing only Yearly Renewable Term insurance. Emu has a surplus reinsurance treaty with ALR. Emu's sales of new business have been declining, and their newly appointed marketing director is considering ways of reversing this trend by innovative ideas for product distribution. Up until now, all of Emu's new business sales have been made through independent advisers. The proposal he wishes to discuss with ALR (as Emu's primary reinsurance provider) involves Emu running Direct Marketing campaigns to community-based groups such as sporting clubs, community service groups and charitable associations.

a) In general terms, list the reasons for life insurers to use the services of a reinsurance company, and outline the products and services that reinsurers offer to meet those needs. (4 marks)

b) How may the assumptions for products to be sold in the proposed manner need to differ from those for the products currently sold through advisers? (4 marks)

c) Identify the risks faced by ALR in offering reinsurance to Emu for products to be sold in the proposed manner, and suggest how ALR could structure its reinsurance terms to mitigate those risks. (4 marks)

d) You are concerned about the viability of the Direct Marketed Yearly Renewable Term insurance product proposed by Emu, and therefore wish to determine the profitability of this product (i.e. the gross of tax yield on transfers) to Emu. To do this, you are about to instruct a new analyst in your team, who is numerically competent but has no experience with projections.

   Prepare a worksheet for these projections, giving headings of and clear definitions for the column headings. Also define the calculation of the yield on transfers. (3 marks)

QUESTION 3 **(17 Marks)**

As the appointed actuary for one of the medium-sized Australian life insurers, you are reviewing the company's sales and lapse experience over the period 2001-06. The experience has been affected by the introduction in mid-2003 of a new sales outlet when the company issued a master agreement to JR & Associates (JRA), a national group of advisers operating under an agency management structure.

An experienced actuarial analyst has provided you with the following results (where all amounts are shown as $A'000):

Year	Total Company Actual Amounts			Total Company Target Amounts			Actual Amounts for JRA business		
	Sales	Lapses	Ratio	Sales	Lapses	Ratio	Sales	Lapses	Ratio
2001	9,824	1,695	17.3%	12,000	1,700	14.2%	-	-	-
2002	7,962	1,536	19.3%	11,000	1,550	14.1%	-	-	-
2003	7,585	1,311	17.3%	11,500	1,400	12.2%	1,485	46	3.1%
2004	11,108	1,804	16.2%	12,000	1,400	11.7%	3,861	754	19.5%
2005	13,457	2,865	21.3%	13,000	1,750	13.5%	5,019	1,698	33.8%
2006	16,019	3,560	22.2%	14,500	2,250	15.5%	5,898	2,190	37.1%

For the purposes of adviser remuneration, a lapse is defined as the termination of a contract before it has acquired a surrender value. Again for the purposes of adviser remuneration, the lapse ratio for any given period (as shown above) is defined as the proportion of lapses to sales in that period.
(Note: you may treat this as an acceptable basis of measurement.)

a) Describe the main features of -
   i. the company's overall sales and lapse experience in the period 2001-06. (4 marks)
   ii. the introduction of JRA as a new sales outlet, on the company's sales and lapse experience. (4 marks)

b) Discuss the risks that the company may be exposed to as a consequence of JRA's contribution to the company's sales and lapse experience. (5 marks)

c) Outline strategies which the company should consider in determining its response to the risks discussed in part (b) of the question. (4 marks)

QUESTION 4 **(18 Marks)**

The Assurance Beneficial Company (ABC) and the Equity Financial Group (EFG) were two Australian life insurers, that have recently merged.

Prior to the merger, ABC specialised in Ordinary risk products (comprising of individual term insurance and disability income) and lifetime annuities, while EFG specialised in investment linked business. EFG's product range comprised of two ordinary savings products (a regular contribution and a single contribution plan), marketed by financial advisers.

The combined entity now operates as Assurance Equity Life (AEL). Its product range is a combination of ABC's product range with that of EFG.

You have just joined AEL as the pricing actuary. As your first assignment, the Chief Executive Officer has asked you for advice about a memo from the marketing department, recommending that a new product be introduced.

Relevant extracts from the memo are:

"…We recommend that a superannuation investment account product be introduced as soon as possible to provide financial advisers with a product to meet the retirement needs of their customers. It should include a guarantee that the account balance will never be reduced, which will appeal very strongly for retirement planning purposes."

"…The asset mix should be aligned to high returns with growth prospects, to provide high crediting rates. In order to expedite introduction of this product, we recommend that the pricing structure from the existing investment linked products be applied, without change, to this new product. That would allow us to introduce both a regular contribution and a single contribution version of this new superannuation product."

"…Initial illustrations can be based on the track record from our High Growth Fund, which has the same asset mix as we propose for this new product. We could simply use gross (pre-tax) returns, adjusted for a lower tax rate applicable to superannuation instead of ordinary business."

"…As an introductory offer, we recommend that a minimum crediting rate of 6% p.a. (or 2% p.a. below the five year average returns achieved by the High Growth Fund) be guaranteed to apply each year over the next five years. That would allow AEL to guarantee the surrender values for policy owners who choose to retire early."

"…We look forward to your early approval to proceed with these proposals."

(Question 4 continues on next page)

a) Outline the normal process for developing a new product of this type. (5 marks)

b) As AEL's pricing actuary, provide (with reasons) your assessment of the approach suggested by the marketing department. (5 marks)

c) List the key factors that you would need to consider in order to recommend a pricing basis to be applied to the proposed product. (5 marks)

d) Explain briefly how your consideration of the key factors in part (c) would change if the proposed new product was recommended to be investment linked, rather than capital guaranteed. (3 marks)

QUESTION 5 **(16 Marks)**

You are a pricing actuary working for an Australian life insurer that is preparing to re-price its individual Disability Income (DII) product, and you are required to determine the economic assumptions for this purpose.

The following tables relate entirely to the individual DII portfolio:

Year	Calculated claims indexation rate	Calculated actual earning rate
2003	2.2%	7.8%
2004	1.9%	7.5%
2005	2.6%	7.6%
2006	2.1%	

Note: Claims Indexation Rate is calculated as the ratio of the average claim size at the end of the year to the average claim size at the start of the year.

Financial Management Accounts for DII	$’000
Opening balance of assets (1/1/2006)	198,300
Premium revenue for 2006	181,500
Investment revenue for 2006	14,700
Claims payments for 2006	127,900
Operating expenses for 2006	49,600
Tax assessed for 2006	3,900
Closing balance of assets (31/12/2006)	213,100

The latest annual morbidity experience investigation shows DII claims incidence rates close to expected. However, DII claims termination rates have decreased significantly over the past 3 years, resulting in significant variations of the actual levels of disabled life reserves from their expected levels.

The economic outlook in the medium to long term is for current conditions to prevail for all asset classes. Note: You may assume that actual assets held are those required to support total policy liabilities both for active lives and disabled lives.

When the DII product was last re-priced (in 2004), the following pricing assumptions were used:

Previous pricing assumptions for DII product (as adopted in 2004)			
Inflation rate	Claims indexation rate	Earning rate	Risk discount rate
2.5%	2.8%	7.2%	8.7%

(Question 5 continues on next page)

a) Calculate the 2006 actual earning rate. (1 mark)

b) State (with reasons) whether the claims indexation rate assumed for pricing should agree with, or may differ from, those calculated for recent periods. (4 marks)

c) It has been drawn to your attention that the calculated actual earning rates relate to assets backing both the active life and disabled life (or open claims) reserves. State (with reasons), for current pricing purposes whether the earning rate should be adjusted to represent active lives only. (3 marks)

d) Describe the effects on policy liabilities and the assets backing these liabilities that the lower than expected claims termination rates would have had, and the possible effects on the benchmark allocation for assets backing this product. (3 marks)

e) Recommend and explain your economic inflation, earning rate and risk discount rate assumptions for the purpose of re-pricing this product. (5 marks)

QUESTION 6 **(17 Marks)**

Essex Life Ltd (ELL) is a medium-sized Australian life insurer whose No.1 Statutory Fund includes a significant block of Whole of Life and Endowment policies issued on a participating basis since 1970. Sales volumes were significant until 1992, with lower sales since then.

You recently joined ELL as retail product actuary, and have just learnt that its sales of annual premium paying traditional business have increased sharply in the last 3-4 years. The main source of recent sales have been endowment policies which are used for insurance against mortgage loans.

Under this arrangement, the amount of the first year's premium is included as part of the mortgage loan provided to the investor. The policy insures the borrower in the event of death and also provides part of the repayment of the mortgage loan upon maturity or surrender.

Policy loans can be taken for up to 90% of the available surrender value of the policy. Illustrations by intermediaries have indicated that increases in surrender values would be sufficient to pay the interest on the policy loan and the annual premium. The experience so far has been that the full loan is borrowed from ELL for each policy at the earliest possible date.

Intermediaries selling this product, receive a large initial "up front" commission and are also eligible to earn additional over-riders which are dependent on the achievement of high sales and low lapses. To date, intermediaries have earned the maximum possible over-riders.

You are provided with the following analysis prepared by a senior actuarial analyst for the 'benchmark' policy (Male aged 30 at entry, Endowment to age 60, Sum Insured $200,000) comparing surrender values as illustrated in sales material with actual current surrender values and the asset share (which represents the accumulated policy cash flows allowing for actual experience) at each duration.

Duration in force	Illustrated SV ($)	Actual SV ($)	Asset Share ($)
1	0	0	– 672
2	4,560	4,130	3,370
3	8,870	8,420	7,530
4	13,340	12,880	11,950
5	17,990	17,510	16,550

(Question 6 continues on next page)

a) Describe the main features in the above comparisons and identify the most likely reasons for these results. (5 marks)

b) You are reviewing the surrender value basis for this block of business. What are the implications of the features evident in the table shown? (4 marks)

c) What are the potential implications of the current situation for ELL's profit distributions via bonuses on its traditional business? (4 marks)

d) Explain the main risks and issues that the current situation might raise
   i. for ELL; and
   ii. for the retail product actuary. (4 marks)

END OF EXAMINATION