Institute of Actuaries of Australia

2009 PART III EXAMINATIONS

Subject Title: **C2B**
Life Insurance

Date: **Wednesday 29th April 2009**

Time**: 1:45 pm – 5:00 pm**

Time allowed: Three (3) hours plus fifteen (15) minutes of reading time

Instructions: Each new question (but not each section of a question) must be commenced in a new answer book.

Number of Questions: **Six** (6)

Question	Marks
1	19
2	19
3	16
4	16
5	12
6	18
Total	**100**

Candidates are required to answer ALL questions.

This paper has nine (9) pages (excluding this page and the blank back page).

INSTITUTE OF ACTUARIES OF AUSTRALIA

C2B LIFE INSURANCE **APRIL 2009 EXAMINATIONS**

Answer all 6 questions.

QUESTION 1 **(19 Marks)**

Superior Life is the Australian subsidiary of an international insurer which uses Independent Financial Advisors (IFAs) to distribute its products. It has been writing individual Yearly Renewable Term (YRT) business for the past 5 years and has a large profitable in-force block of business.

As part of its strategy to grow this business, a new product for higher sums insured was launched 12 months ago that includes "Superior" premium rates for lives that meet a series of stricter underwriting requirements. The "Standard" premium rates were set at the level of the previous product's aggregate premium rates. The marketing department is very pleased with the new product as new sales have exceeded planned sales.

You have recently taken on the role of appointed actuary at Superior Life.

a) **List the possible sources of information you would use to set your valuation assumptions for the new product line, including the information you would obtain from each source** **(3 Marks)**

b) **What are the key issues you will need to consider in determining the policy liabilities for this new product line, and why?** **(4 Marks)**

c) **You have received the following draft profit results for both products for the current financial year on the proposed valuation basis (All numbers in \$ 000's, the valuation basis for the existing product is unchanged).**

	Expected \$000s	Actual \$000s
Premium (MOY)	9,582	9,582
Initial Expenses (MOY)	1,655	1,750
Renewal Expenses (EOY)	493	480
Claims (EOY)	5,048	5,300
Investment Income	289	340
Policy Liability (BOY)	-323	-323
Policy Liability (EOY)	601	253

	Expected	Actual
No. of policies in-force (BOY)	10,993	10,993
No. of policies in-force (EOY)	12,092	12,642

Where BOY = beginning of year, MOY = middle of year, EOY= end of year.

Calculate the expected and actual profit for the year for the YRT products and perform an analysis of profit. (5 marks)

d) **Briefly discuss the possible causes of the unexplained amount. (2 marks)**

e) **Comment on the appropriateness of the current assumptions based on your analysis of surplus, and detail any further investigations you would perform before setting your new valuation assumptions for both products. (5 marks)**

QUESTION 2 **(19 Marks)**

You are the Appointed Actuary of Trad Life a large Asian life insurer with a significant block of Whole Life and Endowment Insurance business. Trad Life actively writes new business in a very competitive market. Distributions of profit to shareholders are limited to 25% of declared bonus. Valuation, solvency and capital adequacy standards are similar to the Australian standards.

The following net investment returns were achieved on the assets in the Traditional Business Statutory Fund:

Year	Asset mix	2004	2005	2006	2007	2008
Cash	10%	2.8%	3.9%	4.0%	3.5%	3.2%
Fixed Interest Investments	30%	5.3%	2.8%	2.1%	4.6%	7.4%
Local Equities	30%	15.4%	17.5%	17.5%	-8.4%	-19.6%
International Equities	15%	3.5%	14.0%	7.7%	-12.6%	-13.3%
Property	15%	7.0%	10.5%	11.2%	4.9%	-4.2%
Total return	100%	11.5%	14.5%	13.0%	-2.8%	-8.6%

The investment allocation has remained stable over the last 4 years due to an active rebalancing in line with the company's strategic asset allocation benchmark. The duration of the fixed interest investments is significantly shorter than that of the liabilities.

The following reversionary bonus rates have been declared over the last 4 years:

Year	2004	2005	2006	2007
Declared Reversionary Bonus rate	4.75%	5.25%	5.25%	5.00%

Terminal bonus rates increased significantly from 2004 to 2006, but were reduced slightly in 2007.

a) **The average declared reversionary bonus rate over the last 5 years has been 5%, and the board would like to declare a similar level of reversionary bonus rate this year.**

Prior to setting your proposed reversionary bonus rate and terminal bonus scale, outline the key considerations you will take into account. **(8 Marks)**

b) You have recommended a reversionary bonus rate of 4% to the board, and a further reduction in terminal bonus rates. After speaking to the head of marketing, the CEO has suggested following your recommendations and also declaring a "one off additional reversionary bonus" of 1%, in view of the level of excess assets which have been built up in the relevant statutory fund.

Outline the advantages and disadvantages of this approach. (3 Marks)

c) The CFO has contacted you for your opinion on the consequences of adopting a different approach. He has suggested changing the strategic asset allocation to the following, in order to reduce the chance of future strains on capital due to negative investment returns:

Cash	**40%**
Fixed Interest Investments	**50%**
Local Equities	**5%**
International Equities	**0%**
Property	**5%**

Draft your response to the CFO, highlighting the consequences of the approach, and also discussing possible alternative approaches. (8 Marks)

QUESTION 3 **(16 Marks)**

You are an actuary working for ABC, a rapidly growing medium sized proprietary Australian Life Insurer who has recently purchased a smaller competitor, DEF.

ABC has recently incorporated DEF's portfolio into its model office system, and is able to produce detailed profit and capital projections by product. It does not currently have stochastic projection capabilities.

ABC and DEF's reinsurance retention levels differ significantly for their retail risk business distributed through third party advisors (TPAs) and ABC's board would like to consider an increase in new business retentions taking into consideration the risk appetite of the merged entity. ABC's board has not formally articulated a risk appetite in a way which assists in formulating reinsurance retention levels.

The current reinsurance arrangements are:

	ABC	DEF
Term life	Surplus, $250,000 per benefit retained	Surplus, $100,000 per life retained
TPD rider	Surplus, $150,000 per benefit retained	Surplus, $100,000 per life retained
Trauma rider	Surplus, $100,000 per benefit retained	Surplus, $100,000 per life retained
Disability Income	Surplus, $2,000 per month	50% quota share

The reinsurance termination clause contains a recapture option for the in-force business with the recapture fee subject to mutual agreement.

a) **What impact do you expect an increased retention to have on product profitability and capital requirements?** **(3 Marks)**

b) **Set out the other factors you would take into account in determining your recommended retention.** **(3 Marks)**

c) The latest embedded value report on the combined entity contains the following information on reinsurance:

Value of In-force Business	Gross	Reinsurance	Net
	$m	$m	$m
Term Life	105	-25	80
TPD	40	-18	22
Trauma	50	-10	40
Disability Income	30	-15	15
Total	225	-68	157
Value of One Year's New Business	Gross	Reinsurance	Net
	$m	$m	$m
Term Life	3	-1.5	1.5
TPD	4	-2.5	1.5
Trauma	0.8	0.5	1.3
Disability Income	1.2	-1.3	-0.1
Total	9	-4.8	4.2

The CEO has expressed dismay that that over half the value added by new business was passed across to ABC's reinsurers. He has proposed introducing a $3,000,000 per life retention for lump sum business and a $10,000 per month surplus retention on the Disability Income business. Initial investigations on the impact of the proposal indicate that the proportion of business ceded to reinsurers will reduce by 90%.

Based on this information and the above embedded value report, the CEO has estimated a $61m increase in the value of in-force business and an increase in the value of one year's new business of $4.3m.

Comment on the suitability of the CEO's estimates in determining the expected financial effect of the proposed new retention. (4 Marks)

d) The Appointed Actuary has indicated that a more rigorous process is required to determine the most appropriate retention, taking into account all financial and other considerations. Outline to the Appointed Actuary the main steps you would take to arrive at your recommended retention, highlighting the issues you would take into account. (6 Marks)

QUESTION 4 **(16 Marks)**

You are the Appointed Actuary of XXY Insurance, a medium sized Australian life insurer, which is particularly strong in the Yearly Renewable Term (YRT) and Disability Income Insurance (DII) markets, and has a significant in-force portfolio of participating business. The holding company of XXY also owns two other Australian life insurers with significant unit-linked portfolios.

The current distribution of statutory fund assets is as follows:

Cash	**15%**
Fixed Interest Investments	**50%**
Equities	**25%**
Property	**10%**

The board has suggested setting the Target Surplus at a level to cover the reduction in free assets of the company following one year's adverse experience in line with the margins used in the calculation of the Capital Adequacy Requirement.

a) **Explain how the proposed Target Surplus policy allows for asset risk, expense risk, mortality/morbidity risk, operational/unit pricing risk.**
(6 Marks)

b) **The board has taken note of your observations that this Target Surplus policy is not consistent with current market best practice. Outline possible enhancements to the Target Surplus policy.** **(6 Marks)**

c) **The board unanimously accepts the proposed new Target Surplus policy above. The following day you receive an email from the CFO "… as our combined entity has a significant excess of capital above our targeted level, the board would like to release this excess capital through a special dividend to our shareholders as part of our capital management programme. As our Appointed Actuary, I would like you to outline the main points to consider before paying this special dividend. "**

   Draft your response to the CFO including comments on possible alternative uses of capital. **(4 Marks)**

QUESTION 5 **(12 Marks)**

A proprietary life insurance company (PLC) currently writes unit-linked business, personal risk business, and has a large in-force traditional with-profit portfolio.

PLC is considering purchasing a portfolio of ordinary (i.e. non-superannuation) unit-linked business from the ULC insurance company. This portfolio is currently managed in a separate statutory fund. You are a consulting actuary who has been asked to advise PLC on the potential purchase.

(a) **Briefly describe the factors you would consider in determining the price to pay for this business.** **(8 Marks)**

(b) **PLC has completed the purchase of the portfolio of business. Although due diligence work highlighted some problems in the policy administration system, subsequent investigations have indicated more serious problems in this area.**

Describe how these problems could affect the company's profitability and capital requirements. **(4 Marks)**

QUESTION 6 **(18 Marks)**

You are the senior actuary of ANOVA, a medium sized subsidiary of a European Life Office in the fictitious country of Ocealia. ANOVA writes group and individual death risk and disability income business in Statutory Fund No. 3, unit linked business in Statutory Fund No. 2 and has a significant conventional participating portfolio in Statutory Fund No. 1

The Shareholders' Fund is entitled to receive all the surplus distributed from Statutory Funds 2 and 3 together with a maximum of 25% of the cost of bonuses declared in respect of the conventional participating business.

The regulatory and financial reporting regime is similar to Australia's, with the following key differences:

- **Liabilities are valued using best estimate assumptions with provisions for adverse deviations (PADs)**
- **Profits and losses may emerge at the point of sale**
- **The effect of changes in liability valuation assumptions are capitalised**

ANOVA performs an annual analysis of the change in shareholder value. Shareholder value is defined as the adjusted net worth plus the present value of future distributable profits of business in-force at the valuation date.

a) **Briefly explain the main components into which the change in shareholder value would be analysed.** **(5 Marks)**

b) **Over the past 12 months an unexpected change in the economic environment has occurred. There has been a significant reduction in inflation. Although the yields available on fixed interest securities have also dropped significantly across the yield curve, bond spreads have widened. Equities have dropped by 30%, and property values have dropped by 10%. Unemployment in Ocealia has started to rise and is expected to increase significantly over the next 12 months as a result of the general economic downturn.**

   The CEO has just reviewed the draft accounts and is surprised to find that distributable profit has increased this year, and has asked you to explain this result. Highlight possible causes of this unexpected result. **(5 Marks)**

c) **The holding company is performing a review of its worldwide operations to understand the profitability, capital and economic value implications of the recent turmoil in the world financial markets as part of its "Duck and Cover" risk management project.**

   Explain the impacts that the changes in the economic environment might have on the components of the change in shareholder value over the year, considering each statutory fund separately. **(8 Marks)**

END OF PAPER