INSTITUTE OF ACTUARIES OF AUSTRALIA

COURSE 2B LIFE INSURANCE **OCTOBER 2011 EXAMINATIONS**

Answer all 5 questions

QUESTION 1 **(19 Marks)**

It is 1 April 2012 and you have just joined a newly formed Australian Life Company, ONLINE life, as Appointed Actuary. You have extensive experience as a Valuation Actuary in other life companies. 1 April 2012 is also the launch date for ONLINE Life.

ONLINE Life sells business exclusively through its website "whyuseanadviser.com".

ONLINE Life's two product lines are:

- **A Funeral Benefit Plan, which pays a benefit of up to $15,000 to cover the cost of the funeral of the life insured.**
- **An Accidental Death product, which pays a maximum sum insured of up to $500,000.**

The financial year ends on 30 September.

You will present the 30 September 2012 Financial Condition Report (FCR) at the November board meeting. The Directors have experience in companies other than a life company, but have no knowledge of life insurance business.

You have a small valuation team of four people, comprising a recently qualified Actuary with 3 years experience in pricing protection products, two Actuarial Analysts and yourself as Appointed Actuary. You will be heavily involved in completing the policy liability valuation as well as writing the FCR.

a) **Describe the difference in the key responsibility between the Appointed Actuary and the Board of Directors.** **(1 Mark)**

b) **The FCR is a complex document. You will spend a significant amount of time writing the FCR, so you will want the FCR to effectively communicate your messages to the Directors.**

   Discuss how you would structure and format the FCR so that your points are effectively communicated to the Directors. **(4 Marks)**

c) **Discuss the issues that you would expect to encounter in preparing the 30 September 2012 FCR, and how you plan to resolve these issues.** **(7 Marks)**

d) **In the FCR you recommend that no dividend be paid to shareholders.**

   i) **Provide possible reasons for recommending no dividend be paid.**

   ii) **For each reason you have provided in i) explain whether or not it is absolutely critical that no dividend be paid.** **(5 Marks)**

e) **Describe the actions you could take if the Directors ignored your recommendation and decided to pay a dividend to shareholders.** **(2 Marks)**

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QUESTION 2 **(19 Marks)**

PCL is an Australian Life Insurer which has a large open book of Yearly Renewable Term (YRT) business, providing lump sum death benefits only. PCL also has other lines of business including a large block of closed participating business. PCL uses Surplus Reinsurance. Advisors receive initial commission of 100% of the first year premium.

All assets are invested in cash.

You are the Valuation Actuary for PCL Life and have received the following YRT profit results for the year ending 30/6/2012:

	Actual	Expected	Actual – Expected with interest on cashflows
	$000s	$000s	$000s
Gross Premiums	214,000	214,000	0
Reinsurance Premiums	-10,800	-10,700	-103
Gross Claims	-111,000	-106,800	-4,314
Reinsurance Claims	4,300	7,500	-3,287
Acquisition Expenses	-19,800	-17,400	-2,465
Renewal Expenses	-46,700	-42,600	-4,211
Net Cashflow	30,000	44,000	-14,380
Investment Income	3,400	3,800	-400
Increase in Policy Liability	-9,700	-2,200	-7,500
Profit	43,100	50,000	-6,900

Policy Liability Information	Actual	Expected
	$'000s	$'000s
For all policies inforce at 30/6/2011:		
IBNR	16,300	16,300
Projection Policy Liability	-254,800	-254,800
Total Policy Liability	-238,500	-238,500
IBNR all policies inforce @ 30/6/2012	16,900	17,200
Projection Policy Liability for inforce at 30/6/2012 that was inforce at 30/6/2011:		
using 30/6/2011 assumptions (with 5.5% rdr)	-237,800	-240,400
using 30/6/2012 assumptions (with 5.0% rdr)	-245,200	n/a
Projection Policy Liability for new business written that is inforce at 30/6/2012 (30/6/2012 assumptions)	-19,900	-17,500
Total Policy Liability @ 30/6/2012	-248,200	-240,700

Notes:

- **Renewal and Acquisition expense items include commission.**
- **All cashflows are assumed to occur half way through the year.**
- **Tax can be ignored.**
- **No reinsurance policy liability is calculated as it is immaterial.**
- **30/6/2012 assumptions are the same as the 30/6/2011 assumptions, except for a change in the risk discount rate (rdr) assumption.**
- **The 30/6/2011 rdr assumption was 5.5% p.a. and the 30/6/2012 rdr assumption is 5.0% p.a.**
- **The expected lapse rate is 10% p.a. with a standard deviation of 1% p.a. (from the recent lapse experience analysis).**
- **Actual lapse rate is 11% for business that was inforce at 30/6/2011. Actual lapse rate is as expected for new business.**
- **The actual investment earning rate of 5.5% p.a. is equal to the expected investment earning rate of 5.5% p.a.**

a) The following items from the analysis of profit have already been calculated:

	$000s
IORE	**15,700**
Expected Profit Margins	**34,300**
Total Experience Profit	**-6,900**
Total Actual Profit	**43,100**
Investment Experience Profit	**0**
Renewal Expenses Experience Profit	**-4,211**

Given this information and the cashflow experience profits with interest above, complete the analysis of profit for the Experience Profit for the year (showing all workings).

In your analysis of profit, where you consider it is appropriate, allocate each component of the change in policy liability to a cashflow item.

In your answer, include a table summarising the analysis of profit, including all components of the actual profit. **(7 Marks)**

b) Comment on each experience item in the analysis of profit, explaining with reasons whether or not there is a potential issue that needs further investigation. **(6 Marks)**

c) Describe the investigations you would undertake in regard to the issues identified in b). **(6 Marks)**

QUESTION 3 **(22 Marks)**

You are the Appointed Actuary of LONGLIFE, an Australian life insurer. LONGLIFE has a large existing portfolio of group life business. Strong sales growth is expected to continue into the future.

MU Life is an overseas life insurer. AUSMU Life, its Australian subsidiary, has a medium sized portfolio of individual yearly renewable risk business (YRT), providing lump sum death, total permanent disability and trauma benefits.

AUSMU Life has been struggling in the Australian market in terms of shrinking market share of YRT new business. MU Life has approached LONGLIFE to seek LONGLIFE's interest in buying AUSMU Life, including its tied agency force.

The CEO of LONGLIFE has asked you to support the bidding process.

You have been provided with the following information from AUSMU LIFE (as at 31 December 2011). All numbers are in $m.

Total Assets	**200**
Best Estimate Liability	**-1,800**
PV future MOS profit margins @ 5% rdr	**1,600**
Policy Liabilities	**-200**
Other Liabilities	**20**
Capital Adequacy Requirement (excluding Other Liabilities)	**100**
PV future MOS profit margins @ 8% rdr	**1,200**
Value of each $100 face value of capital required for inforce business @ 8% rdr	**70**
Actual Sales for 2011	**50**
<u>In respect of 2012 forecast sales:</u>	
Forecast Sales	**50**
Value of future MOS profit margins @ 5% rdr	**180**
Policy Liability (just after first premium is paid)	**-40**
Capital Adequacy Requirement (just after first premium is paid)	**10**
Value of future MOS profit margins @ 8% rdr	**130**
Value of each $100 face value of capital required for new business @ 8% rdr	**60**

Note: The value of face value of capital required is the sum of the present value @ 8% rdr of the following amounts determined for each year of the projection:

- **release of the capital in the year; and**
- **the interest earned (using the investment earning rate) on the capital at the start of the year.**

Assumptions	
Risk discount rate	**8%**
Sales growth rate for 2013 +	**9%**
Margin squeeze rate for 2013 +	**4%**
Investment earning rate	**5%**

The sales growth rate and margin squeeze rate reflect the situation after LONGLIFE has purchased the YRT business from AUSMU, with sales through AUSMU's tied agency force starting from 1 January 2012.

a) For the Value of Inforce Business:

i) Set out the formula for calculating the Value of Inforce Business (ignore tax). In your answer, explicitly state all cashflow items.

ii) Derive an alternative formula that will use the information above by re-expressing the formula in i). Show all steps in your derivation.

iii) Use your formula in ii) to calculate the Value of Inforce Business.
(3 Marks)

b) For the Value of New Business:

i) Specify a formula for calculating the value of 2012 forecast sales that uses the information above (ignore tax). (1 Mark)

ii) Explain the reasons for the differences between this formula and the formula you have used for the Value of Inforce Business. (2 Marks)

iii) Use your formula in i), to calculate the Value of New Business. Assume sales are written for ever and on average sales occur half way through the year.
(3 Marks)

c) Complete your calculation of the estimate of the Appraisal Value by calculating:

i) the Adjusted Net Worth
ii) the Appraisal Value

(1 Mark)

You now wish to review the assumptions supplied by AUSMU Life.

d) In respect of the discount rate:

i) Set out the formula for calculating the risk discount rate using the CAPM Method, explaining all terms in the formula. (2 Marks)

ii) Ignoring the factors associated with the CAPM Method, describe the other factors you may need to consider in setting a risk discount rate. (2 Marks)

e) In respect of the risk discount rate assumption provided by AUSMU Life:

i) Discuss the appropriateness of the risk discount rate. (2 Marks)

ii) Recommend any changes you would make to the risk discount rate assumption with reasons. In your answer, also describe the impact of the change in the risk discount rate assumption on the various components of the Appraisal Value. (2 Marks)

f) In respect of the sales growth rate and margin squeeze rate assumptions provided by AUSMU Life:

i) Discuss the appropriateness of the sales growth rate assumption. (No discussion is required on the margin squeeze rate assumption). (2 Marks)

ii) Recommend any changes you would make to the sales growth rate and margin squeeze assumptions with reasons. In your answer, also describe the impact of the changes to these assumptions on the Value of New Business. (2 Marks)

QUESTION 4 **(20 Marks)**

You are the Valuation Actuary for AUSLIFE, an Australian Life Company which has a large block of individual disability income policies, comprising 1 year, 2 year, 5 year and to age 65 benefit terms. AUSLIFE distributes its products through a dedicated advisor network to which it pays commissions of 100% of the first year's premium and 10% of subsequent years' premiums.

Features of the MOS method of calculating policy liability by AUSLIFE for the disability income product are:

- **A projection method is used to calculate the policy liabilities, except for the IBNR and RBNA where an accumulation method is used.**
- **IBNR is calculated as Annual Premium Inforce x risk claims ratio x average delay period (between incurred and reported dates) in months/12, where the risk claims ratio and average delay period are assumptions.**
- **RBNA is calculated as Annual Premium Inforce x risk claims ratio x average delay period (between reported and admitted dates) in months/12, where the risk claims ratio and average delay period are assumptions.**
- **There is one related product group covering both Actives lives (for policies which currently do not have disability claims in payment) and Disabled Lives Reserve ("DLR", for disability claims in payment).**
- **Expected claim payments (adjusted for actual premium volumes) is the profit carrier.**
- **A 1% increase in the risk discount rate (rdr) assumption increases the active lives policy liability (makes the policy liability less negative) by 10%.**

AUSLIFE has the following investment strategy:

- **Indexed bonds back the DLR with the matching of claim payments in terms of timing and amount.**
- **All other assets are invested in cash and short-term fixed interest.**

From the latest valuation we have the following information (all figures are in $m):

Policy Liabilities:	
IBNR and RBNA	**50**
Active lives policy liability	**-600**
DLR	**300**
	-250
Other Liabilities	**50**
Retained Profits	**900**
Total Assets	**700**

a) The CEO would like to understand the reasoning behind using expected claim payments (adjusted for actual premium volumes) as the appropriate profit carrier rather than actual claims or actual premiums.

Provide a response to the CEO. In your answer:

i) Set out the principle from LPS1.04 that outlines the appropriate profit carrier to use. (1 Mark)

ii) Describe the service provided by the insurer to the policyholder. (1 Mark)

iii) Describe why actual claims would be more appropriate as a profit carrier than actual premiums. (1 Mark)

iv) Describe why expected claim payments (adjusted for actual premium volumes) is more appropriate as a profit carrier than actual claims. (2 Marks)

b) The CEO has noted that the MOS profit for the disability income product has been volatile over the past few years. This is despite the strong management control of expenses, where actual expenses have matched budgeted expenses.

You explain to the CEO that the volatility in profit can arise from assumption changes (economic and non-economic) and experience effects.

i) Describe the economic assumption changes that may have contributed to the profit volatility, explaining how this assumption change may have made the profit volatile. (3 Marks)

ii) Describe the non-economic assumption changes that may have contributed to the profit volatility, explaining how these assumption changes may have made the profit volatile. (2 Marks)

iii) Describe the experience items that may have contributed to the profit volatility, explaining how these experience items may have made the profit volatile. (3 Marks)

c) A key strategy of AUSLIFE is to continue to sell the disability income product in the market, despite the profit volatility. However, the CEO would like to stabilise the profit for the disability income product.

Describe the actions that can be taken to reduce the profit volatility, explaining how these actions will achieve a reduction in profit volatility. (7 Marks)

QUESTION 5 **(20 Marks)**

You are the Appointed Actuary for a medium size Australian life insurer named ABC life that has an open portfolio dominated by yearly renewable term business (YRT) and single premium term business (SPT). Both products provide lump sum death benefits only. The company has been successful in writing considerable amounts of profitable new business in recent years.

ABC life has a reinsurance arrangement with a reinsurer to reinsure the YRT and SPT business.

Assets are invested in cash.

The new CFO, who comes from a banking background, is convinced that the company is sitting on large amounts of capital that could otherwise be released to shareholders. He has approached you to better understand the capital requirements with a view to reducing them.

a) **Explain what is meant by the Capital Adequacy Liability and describe how it is calculated.** **(2 Marks)**

b) **Explain why the New Business Reserve may be zero under the Capital Adequacy Standard.** **(1 Mark)**

c) **In respect of a Future Income Tax Benefit (FITB):**

   i) **Explain how a FITB arises.** **(1 Mark)**

   ii) **Explain why a FITB may be an inadmissible asset under the Solvency Standard but an admissible asset under the Capital Adequacy Standard.** **(3 Marks)**

d) **The CFO has noticed in the FCR that there is a mortality margin of 40% being applied to the best estimate mortality assumptions for all business. This is at the high end of the 10% - 40% range specified by the Capital Adequacy Standard.**

   The CFO tells you he finds the existing figure of 40% hard to believe as he saw mortality experience profits in the analysis of profit for the past year and only ever hears about mortality improvements in the press. The CFO is interested in hearing your views on the potential to reduce the margin below 40%.

   Discuss the points you would include in your response to the CFO. Include in your answer, reasons why a 40% margin may have been chosen. **(6 Marks)**

e) You produce the following preliminary results:

	$m
Total Assets	**580**
Policy Liabilities:	
- YRT	**-100**
- Single Premium Term	**370**
	270
Other Liabilities	**50**
Capital Adequacy Requirement	**600**
Excess Assets over Capital Adequacy Requirement	**-20**

The CFO is in the process of writing a recommendation to the Board to ask for a shareholder injection of $20m to bridge the gap between assets and the Capital Adequacy Requirement.

Draft a memo to the CFO explaining the reasons why he may wish to ask for a capital injection in excess of the $20m amount, including the specific risks the company faces. **(7 Marks)**

END OF PAPER