2012 PART III EXAMINATIONS

Subject Title: **C2B Life Insurance**

Date: **Thursday 26 April 2012**

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: **Five** (5)

Question	Marks
1	19
2	21
3	19
4	20
5	21
Total	**100**

Candidates are required to answer **ALL** questions.

This paper has **ten** (10) pages (excluding this page).

COURSE 2B LIFE INSURANCE APRIL 2012 EXAMINATIONS

Answer all 5 questions

QUESTION 1 **(19 Marks)**

You are the Capital Management Actuary for a medium size Australian life insurer named TOPLIFE which has a portfolio dominated by a block of lifetime annuities sold by advisors.

You have been provided with the following listing of the company assets:

		$m	%
Australian Government Bonds	Commonwealth Government Indexed Bonds	1,830	61%
Corporate Bonds	Farmers Limited indexed Bonds AAA rated	120	4%
Wholesale Trusts	LT Management Fund	600	20%
Direct Property	123 Main Street Office Building	210	7%
Other Assets	Computers	30	1%
Future Income Tax Benefit		120	4%
Goodwill	From purchase of another company	90	3%
Total		3,000	100%

Additional information:

1. The wholesale trust has 40% of assets invested in BHP shares and 60% in fixed interest (NSW and Victoria state government bonds).
2. 123 Main Street building is the current headquarters for TOPLIFE.
3. Resale value of computers is 50% of the $30m shown in the balance sheet.
4. The duration of the liabilities is longer than the duration of any of the fixed interest investments.

a) For lifetime annuities, the Solvency Requirement can be expressed simply as a sum of components, without the need to apply maximum tests at various stages in the calculation.

  i) Set out the formula for the Solvency Requirement. (1 Mark)

  ii) Specify the maximum tests and provide reasons why these maximum tests do not need to be applied for lifetime annuities. (2 Marks)

b) For each asset in the balance sheet above, calculate the amount of the asset which is inadmissible under the Solvency Requirement, providing reasons and showing all workings.

  Also calculate the total inadmissible assets under the Solvency Requirement. (5 Marks)

c) For each Inadmissible Asset under the Solvency Requirement discuss ways, if any, in which the asset could be restructured so as to reduce the Inadmissible Asset Reserve for the Solvency Requirement. (3 Marks)

The Solvency Requirement dominates so much that the Minimum of the Solvency Requirement applies in the calculation of the Capital Adequacy Requirement. Hence the Capital Adequacy Requirement is equal to the Solvency Requirement plus New Business Reserve.

d) A change in interest rates can have a significant impact on annuity business.

Describe the impact a uniform decrease in interest rates (including current market fixed interest/cash yields and discount rates on Solvency Requirement, Capital Adequacy Requirement and Policy Liability calculations) has on:

i) The Capital Adequacy Requirement. As the Capital Adequacy Requirement equals the Solvency Requirement plus the New Business Reserve, include in your answer the impact a decrease in interest rates has on each component of the Solvency Requirement and the New Business Reserve. (7 Marks)

ii) The Solvency Liability less the Policy Liability. You have been informed that the annuity business is in loss recognition. (1 Mark)

QUESTION 2 **(21 Marks)**

You are the Valuation Actuary for DYNAMIC LIFE, an Australian Life company which writes a large amount of individual Yearly Renewable Term business (YRT).

Currently, the company uses MOS Profits to measure financial performance. No Appraisal Value calculations are currently performed.

The company's financial year end is 31 December.

The CEO is reviewing the approach to measuring financial performance. This will feed into decisions including future initiatives and executive compensation.

The CEO is considering whether to use the Appraisal Value or Margin on Services to monitor the performance of the company.

a) Describe the advantages of Appraisal Value reporting over Margin on Services reporting for evaluating company performance. Structure your answer in this form:

Feature	**Appraisal Value**	**Margin on Services**
Feature 1	Describe why this feature is an advantage.	Describe why this feature is a disadvantage.

(6 Marks)

The CEO has decided to start using the Appraisal Value to monitor the company's performance. The Appraisal Value will be calculated once a year at the end of the financial year on 31 December.

b) Describe the issues that may arise from using the Appraisal Value as a measure of management performance. (3 Marks)

c) Describe actions you could take for each of the issues you raised in part b). (5 Marks)

The first Appraisal Value has been calculated at 31/12/2011 (using data at this date).

A summary of the 31/12/2011 Appraisal Value shows the following:

	$m
Components of 31/12/2011 Appraisal Value:	
Value of Inforce (VIF)	127
Value of Future New Business (VNB)	155
Adjusted Net Worth (ANW)	30
Total	347
Value of 1 year's New Business written in 2012	14
Expected distributable profit for 2012 for 31/12/2011 Inforce Business	26
Expected distributable profit for 2012 for new business written in 2012	2
Capital Adequacy Requirement at 31/12/2011	40
Assets at 31/12/2011	70

Assumptions:

- Risk Discount Rate is 12% p.a.
- Expected investment earning rate is 5.5% p.a.

d) The CEO has asked you to calculate the expected Appraisal Value Profit for 2012.

Using the information above, determine the expected change in the Appraisal Value and its components (VIF, VNB and ANW) from 31/12/2011 to 31/12/2012. Assume all new business for 2012 is written on 1/1/2012 and all distributable profits occur at 31/12/2012. (4 Marks)

e) A target surplus policy is about to be introduced for the company. The CEO is concerned about how the 31/12/2012 Appraisal Value Profit may be impacted by including target surplus in capital requirements for the first time.

At 31/12/2011 the target surplus was $10m.

i) Describe with reasons the impact of including a target surplus of $10m as at 31/12/2011 on each component of the 31/12/2011 Appraisal Value and the overall impact on the Appraisal Value. Ignore the Value of New Business as you can assume the target surplus for new business is immaterial. (2 Marks)

ii) Provide a formula which estimates the impact on the 31/12/2011 Appraisal Value of including $10m target surplus at 31/12/2011 as a function of the average duration (in years) of the YRT portfolio. (1 Mark)

QUESTION 3 **(19 Marks)**

You are the Valuation Actuary for CARELIFE, an Australian Life company which writes a large amount of individual Yearly Renewable Term business (YRT) and group life business. Lump sum benefits are provided, covering death and TPD for YRT and group life business.

The financial year end is 30 September.

Policy Liabilities are:

YRT	IBNR + Best Estimate Liability + PV Future Profit Margins
Group Life	IBNR + UPR

For each product, the IBNR is in a separate related product group.

The new CFO has no experience in life insurance.

a) The CFO would like to understand the reasoning behind holding an IBNR Reserve as a component of the Policy Liability. Describe the reasons for holding an IBNR Reserve. (2 Marks)

Various methods can be used to calculate the Incurred But Not Reported (IBNR) Reserve including a Ratio method and a Chain Ladder method.

<u>Ratio Method:</u>

Under the Ratio Method the IBNR Reserve 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.

<u>Chain Ladder Method:</u>

Determining IBNR Reserve using a claim run off as in this diagram:

Actual cumulative claims

Projected cumulative claims = cumulative claims previous month x Development factor

Development Month

(Month Reported - Month Incurred)

Claim Month	**0**	**1**	**2**	**3**	**4**	**5**	**IBNR**
Jul 2011	300	500	650	820	920	940	0
Aug 2011	400	700	900	1000	1050	**1073**	23
Sep 2011	500	900	1200	1300	**1407**	**1438**	138
Oct 2011	300	570	750	**851**	**921**	**941**	191
Nov 2011	400	750	**983**	**1115**	**1207**	**1234**	484
Dec 2011	300	**540**	**708**	**803**	**869**	**888**	588
Development Factor		1.800	1.311	1.135	1.082	1.022	**1,423**

<u>Sum of cumulative claims current month</u>
Sum of cumulative claims previous month

b) The Ratio method is quicker to calculate than the Chain Ladder method.

Discuss other differences between the Ratio method and the Chain Ladder method for calculating the IBNR Reserve. (6 Marks)

CARELIFE uses the Ratio method to calculate IBNR Reserves.

The claims ratio and average delay period assumptions are reviewed and changed if necessary every three years. The average delay period assumption is based on experience data which is analysed every three years.

A detailed claims experience analysis is carried out every year for all products. Claim assumptions, used in the projection policy liability for individual business are reviewed and changed if necessary, each year.

You are attending the September profit meeting, the last such meeting before the financial year end. You advise the CFO at the meeting that:

- You have just reviewed the experience and have recommended the average delay period assumption be increased for individual TPD and group TPD. The expected death claims ratio assumption will also need to increase for group insurance.
- You inform the CFO that these changes in assumptions will increase the IBNR Reserve by $20m and thus reduce gross profit by $20m.

The CFO is bewildered and very surprised by your announcement. The CFO is not happy as the actual profit was on line to meet budgeted profit for the full financial year. The CFO suggests deferring the IBNR impact to next year.

Draft a memo to the CFO which covers:

c) Your response to the CFO's proposal to defer the impact of the IBNR assumption changes. (4 Marks)

d) Recommendations for changes in processes which would prevent such a surprise happening again in the future. (4 Marks)

e) Suggested methods you could use to communicate better with the CFO. (3 Marks)

QUESTION 4 **(20 Marks)**

You are the Appointed Actuary for LONGLIFE, an Australian life insurance company. LONGLIFE has a large portfolio of unit-linked business sold through an agency network and a large closed block of traditional participating business.

The unit-linked business is held in Statutory Fund No.1 with a balanced asset mix reflecting policyholder's investment choices.

The traditional business is held in Statutory Fund No.2. Policyholder bonuses are in the form of a compound reversionary bonus and a terminal bonus. Both of these bonuses are paid out on death, surrender and maturity.

Reversionary bonuses are declared every 30 June.

The financial year end is 30 September.

A large amount of policyholder and shareholder retained earnings have built up over time in Statutory Fund No.2. The company's traditional products were marketed emphasising the company's long term financial soundness and stability.

The actuarial department of LONGLIFE undertakes various activities covering the calculation of Policy Liabilities, Solvency and Capital Adequacy Requirements.

a) According to the note to the financial statements about methods used to calculate policy liabilities, the accumulation method is used for unit-linked products.

   Are there circumstances where projections are used for unit-linked business for the various activities the actuarial department performs ? Briefly describe these circumstances. (3 Marks)

b) As part of the policy liability process for traditional business, the best estimate bonus rate is recalculated at the end of the year. The single best estimate bonus rate is expressed as a % of current sum assureds and accrued reversionary bonuses.

   i) Specify a formula for calculating an estimate of the best estimate bonus rate, given the following information:

      - Policy Liability
      - Best Estimate Liability
      - Current declared reversionary bonus rate
      - PV future reversionary bonuses at the current declared reversionary bonus rate
      - Policyholders/Shareholder share 80%/20% of total profits.

      Ignore tax and the terminal bonus.

      (1 Mark)

By referring to the formula in i) explain with reasons the impact on the best estimate bonus rate of the following:

ii) Negative investment return over the year (with no change in the investment earning rate assumption). (2 Marks)

iii) Decrease in the lapse rate assumption. (2 Marks)

c) Discuss the relationship between the best estimate bonus rate and the declared bonus rate. (2 Marks)

d) The company has declared a 4% reversionary bonus for a number of years and expects to declare a 4% rate at the next declaration date on 30 June 2012.

Overnight on 29 June 2012, concerns that other countries besides Greece in the European Union may default on their debts, sends shock waves to all economies including Australia. The next morning on 30 June 2012, the assets in Statutory Fund No.2 fall significantly, reflecting falls in Australian and International share markets.

On the morning of the 30 June 2012, the CEO calls you to an emergency meeting with him. You inform him that immediate action is required to reduce bonuses, either by reducing the proposed declared reversionary bonuses at 30 June 2012 or reducing terminal bonuses immediately. By the close of business on 30 June 2012, assets in the No.2 Fund have fallen by 5%.

For reducing the declared reversionary bonuses for 30 June 2012:

i) Discuss the impact on the equity between different generations of policyholders. (1 Mark)

ii) Discuss other impacts. Ignore the impact on the policy liability. (4 Marks)

For reducing terminal bonuses immediately, effective 30 June 2012:

iii) Discuss the impact on the equity between different generations of policyholders. (1 Mark)

iv) Discuss other impacts. Ignore the impact on the policy liability. (3 Marks)

e) Based on your answers to part d), which of the two methods of reducing bonuses do you consider is the more effective one in this situation and why ? (1 Mark)

QUESTION 5 **(21 Marks)**

You are the actuary working with an audit firm engaged to carry out an audit of an Australian life company, EASYLIFE. EASYLIFE sells a single premium unit-linked superannuation product through advisors. Features of the product are:

- There is only one investment option which is a "balanced" investment profile.
- All inflows occur at the start of the year and all outflows occur at the end of the year.
- Product fees and commissions:

Upfront Commission (start of year)	5.0% of deposit premium
Trail Commission (end of year)	0.5% of Account Balance after investment income added
Upfront Fee (start of year)	2.5% of deposit premium
Ongoing Fee	2.0% of Account Balance after investment income added

To enable you to perform your audit you have been provided with the following information at the year end:

Annual Profit and Loss Statement:

Profit and Loss (Fees less Expenses)	**$m**
Upfront Fee	3.836
Ongoing Fee	18.242
Upfront Commission	-7.687
Trail Commission	-4.128
Expenses*	-4.472
Change in MSE (Management Service Element)	2.311
Interest on Shareholder Retained Profits	0.043
Profit	**8.144**
New Single Premium	153.730
Withdrawals	-94.520
Policyholder Investment Income	9.265

* expenses are taken from EASYLIFE's general ledger. Your audit colleagues have verified this number.

Tax has been ignored for simplicity.

Policy Liabilities

$m	**Start of year**	**End of Year**
Account Balance	670.000	716.848
MSE	-11.550	-13.861
Policy Liability	658.450	702.987

The Management Service Element (MSE) is determined based on a projection of future ongoing fees to the end of the term of the policy at the previous year end, with a proportion of ongoing fees each year used to recover the MSE at the previous year end.

From this, the projected MSE is calculated at the end of each year into the future. This is then expressed as a projected MSE % of projected Account Balance for each year into the future. The MSE at the current valuation date is the projected MSE % (from the previous year end) of the Account Balance at the current valuation date.

a) In accordance with accounting standards, for a single premium unit-linked product:

   i) Describe what type of contract it is and why it is classified as such ?

   ii) On what basis is the policy liability calculated ?

(1 Mark)

b) Describe how the policy liability is calculated. In your answer briefly explain each component of the policy liability. (2 Marks)

c) The audit partner has requested you investigate the financial statements and report your findings.

   i) Given the information above on the financial statements, perform checks on the financial statements, showing all your workings, and stating whether any investigations need to be carried out. (5 Marks)

   ii) Before you start reviewing the analysis of profit, describe the additional checks you would carry out based on additional information you would request from the company. (2 Marks)

d) You are now reviewing the analysis of profit. In particular, the MSE experience profit for the year shows the following:

Actual Change in MSE	= -$2.311m
Expected Change in MSE	= -$4.456m
MSE experience Profit	= -$2.145m

   i) Describe possible reasons for the MSE experience loss. (4 Marks)

   ii) Describe additional information you would need to investigate the MSE experience loss in more detail. (2 Marks)

Subsequently the company has indicated that there have been a couple of developments:

- The contract with an external vendor providing administration services has been renegotiated at a higher cost. This will increase fixed expenses by approximately $3m per annum.
- The company has also indicated that the product is likely to close to new business, as the product is less popular with advisors.

e) Discuss the impact of these developments on the policy liabilities. (5 Marks)

END OF PAPER

