**COURSE 2B LIFE INSURANCE** **APRIL 2012 EXAMINATIONS**

**Marking Guide**

**Level of Difficulty**

| Question | Syllabus Performance Outcome | Units | Knowledge & Understanding | Straight-forward Judgement | Complex Judgement | Total Marks |
|---|---|---|---|---|---|---|
| 1 a) | 4 | 2 | 1 | 2 | | 3 |
| 1 b) | 4 | 2 | 4 | 1 | | 5 |
| 1 c) | 4 | 2 | | 3 | | 3 |
| 1 d) | 4 | 2 | | 1 | 7 | 8 |
| 2 a) | 1,8 | 1,4 | | 6 | | 6 |
| 2 b) | 8 | 4 | | | 3 | 3 |
| 2 c) | 8 | 4 | | | 5 | 5 |
| 2 d) | 8 | 4 | 4 | | | 4 |
| 2 e) | 4,7 | 2,4 | | 3 | | 3 |
| 3 a) | 1,2 | 1 | 2 | | | 2 |
| 3 b) | 1,2 | 1 | | 6 | | 6 |
| 3 c) | 1,2,12 | 1,6 | | 1 | 3 | 4 |
| 3 d) | 1,2,12 | 1,6 | | | 4 | 4 |
| 3 e) | 1,2,12 | 1,6 | | 3 | | 3 |
| 4 a) | 1,2,4,5,6,7 | 1,2,3,4 | 3 | | | 3 |
| 4 b) | 1,2,3 | 1,2 | 1 | 4 | | 5 |
| 4 c) | 1,2,3 | 1,2 | | 2 | | 2 |
| 4 d) | 4,5 | 2,3 | | 1 | 8 | 9 |
| 4 e) | 4,5 | 2,3 | | 1 | | 1 |
| 5 a) | 1,2 | 1 | 1 | | | 1 |
| 5 b) | 1,2 | 1 | 2 | | | 2 |
| 5 c) | 1,2 | 1 | 2 | 4 | 1 | 7 |
| 5 d) | 5 | 3 | | 6 | | 6 |
| 5 e) | 1,2,5 | 1,3 | | | 5 | 5 |
| **TOTAL** | | | **20** | **44** | **36** | **100** |

**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 1: SOLUTIONS**

a)

i)

The Solvency Requirement is expressed as:

Solvency Liability + Expense Reserve + Other Liabilities + Inadmissible Asset Reserve + Resilience Reserve (1 mark SJ)

**Marking Guide**

**1 mark SJ for specifying the correct formula.**

ii)

It takes this form because the following two tests do not increase the Solvency Requirement at the stage they are applied:

- Maximum of Solvency Liability and Minimum Termination Value (0.5 mark KU)

  Under the Solvency Standard the Minimum Termination Value is the Best Estimate Liability using the solvency adverse assumptions. This is the same as the Solvency Liability so this test just gives the Solvency Liability. (0.5 mark SJ)

- Maximum of Current Termination Value and Solvency Liability plus Expense Reserve (0.5 mark KU)

  The Current Termination Value equals the Solvency Liability so this stage just gives the Solvency Liability + Expense Reserve (0.5 mark SJ)

**Marking Guide**

**Marks as specified above for each point with an appropriate explanation.**

**To a maximum of 2 marks (1 mark KU, 1 mark SJ).**

b)

Inadmissible Asset Reserve for the Solvency Requirement is calculated as follows:

| Investment | Comment |
|---|---|
| Australian Government Bonds | All Australian Government Bonds are admissible assets, so inadmissible assets is 0.<br>(0.25 mark KU) |
| Corporate Bonds | Inadmissible assets is 0 as corporate bonds are 4% of assets (< 5% asset concentration limit).<br>(0.25 mark KU) |
| Wholesale Trust | BHP Shares in Wholesale Trust are 8% = (40% x 20%) of total assets.<br>(0.25 mark KU)<br><br>Exceeds the asset concentration limit of 5% of total assets.<br>(0.5 mark KU)<br>Inadmissible assets<br>= ( 8% - 5%) x 3,000<br>= 90<br>(0.25 mark KU) |
| 123 Main Street Office Building | The direct property is 7% of assets which exceeds the asset concentration limit of 5% of total assets.<br>(0.5 mark KU)<br>Inadmissible asset:<br>= (7% - 5%) x 3,000<br>= 60<br>(0.25 mark KU) |
| Computers | As the company is In a run off situation under solvency, it will need to sell the computers quickly but will only get 50% of the value.<br>(0.5 mark KU)<br>Inadmissible asset:<br>= 30 x 50%<br>= 15<br>(0.25 mark KU) |
| FITB | Assets (including those with unrealised capital gains) may need to be sold quickly and at a value much less than their purchase price. This means there are no unrealised gains generating a deferred tax expense that the FITB can be offset against. Hence the FITB cannot be realised in the future and is thus inadmissible.<br>Inadmissible asset<br>= 120.<br>(1 mark SJ) |

| | |
|---|---|
| Goodwill | An intangible asset so no value can be attributed in a run off situation.<br>= 90<br>(0.5 mark KU) |
| Total | 375<br>(0.5 mark KU) |
| **Marks** | **Marks as specified above to a maximum of 5 marks (4 marks KU, 1 mark SJ).** |

c)

Actions to reduce the Inadmissible Asset Reserve under the Solvency Requirement include:

BHP Shares

- Can easily and readily sell down these shares on the liquid stock market to $60m (5% of total assets). This will reduce the inadmissible assets by $60m. (0.5 marks SJ)

Direct Property

- The company also incurs a high addition to the inadmissible assets reserve for the direct property holdings. This is a large single asset, and hence it is not possible to sell off part of the asset. Also it is the company headquarters. (1 mark SJ)
- A possible solution is to sell the building to another investor, for example a property trust, and then lease it back. (0.5 marks SJ)
- Other valid points with a reasonable explanation. (0.5 mark SJ)

Computers

- With the next update to its computer system, it could seek to lease this from a computer provider. This probably cannot happen straight away. (0.5 mark SJ)

Future Income Tax Benefit and Goodwill

- It is hard to see how the company can change the FITB and the Goodwill. (0.5 mark SJ)

**Marking Guide**

**Marks as specified above for each point made with a reasonable explanation**

- **A maximum of 0.5 mark SJ for discussion on BHP shares.**
- **A maximum of 1.5 marks SJ for discussion on Direct Property.**
- **A maximum of 0.5 marks SJ for discussion on Computers.**
- **A maximum of 0.5 marks SJ for discussion on FITB and Goodwill.**

**To a maximum of 3 marks SJ.**

d)

i)

A decrease in interest rate has the impact on each component of the Capital Adequacy Requirement (equals Solvency Requirement plus New Business Reserve) as follows:

Solvency Requirement

Solvency Liability:

- A decrease in the discount rate will result in an increase in the Solvency Liability. (0.5 mark CJ)

Other Liabilities and Expense Reserve:

- Should not change as a result of a decrease in interest rates. (0.5 mark SJ)

Inadmissible Assets:

- A decrease in interest rates through current market yields will increase the value of assets as well. This could lead to movements in the inadmissible assets reserve. (0.5 mark CJ)

- For example the decrease in the yield for Farmers Limited AAA rated indexed bonds could increase its value of assets more than other assets to such an extent it now exceeds 5% of the total assets. The amount above 5% of total assets would now be inadmissible. (1 mark CJ)

- However, there might be a reduction in the inadmissible assets reserve as it may only be the admissible parts of the assets that increase in value. The asset concentration tests will then be less significant (1 mark CJ)

- Other valid points with an appropriate explanation. (0.5 mark CJ)

Resilience Reserve:

- There is a fixed component in the yield change which means the prescribed yield change is not totally in proportion to the yield. With a lower current market yield, this will have a greater impact on the change in the liability and assets and thus the resilience reserve will increase. (1 mark CJ)

- Also, at lower discount rates both the duration of liabilities and assets are longer and hence these are more sensitive to further discount rate changes. (1 marks CJ)

- Furthermore as the duration of the liability is greater than the duration of the assets, the greater the mismatch. For a lower discount rate, the liability will increase by more than the increase in the asset. Thus the resilience reserve will increase. (1 mark CJ)

- Other valid points with an appropriate explanation. (0.5 mark CJ)

New Business Reserve

- Similar to the impact on the components of the Solvency Requirement, the components of the Solvency will increase from a decrease in interest rates. This means the projected Solvency Requirement over the next three years will increase, resulting in an increase in the New Business Reserve. (1 mark CJ)

Overall Impact on Capital Adequacy Requirement

- Capital Adequacy Requirement increases as most of its components have increased. (0.5 mark SJ)

**Marking Guide**

**Marks as specified above with an appropriate explanation with:**

- **Maximum of 0.5 marks CJ for discussion on Solvency Liability.**
- **Maximum of 0.5 marks SJ for discussion on Other Liabilities and Expense Reserve.**
- **Maximum of 2.5 marks CJ for discussion on Inadmissible Asset Reserve.**
- **Maximum of 2 marks CJ for discussion on Resilience Reserve.**
- **Maximum of 1 mark CJ for discussion on New Business Reserve.**
- **Maximum of 0.5 mark SJ for overall impact on Capital Adequacy Requirement.**

**To a maximum of 7 marks (1 mark SJ, 6 marks CJ).**

ii)

If discount rates decrease then the Solvency Liability less Policy Liability (Best Estimate Liability as 0 profit margins) will increase as the Solvency Liability will increase by a larger amount than the Best Estimate Liability as the former has a higher duration with the adverse solvency margins. (1 mark CJ).

**Marking Guide**

**Marks as specified above with an appropriate explanation**

**To a maximum of 1 mark CJ.**

**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 2: SOLUTIONS**

a)

Advantages of Appraisal Value reporting over Margin on Services reporting:

| Feature | Advantage for Appraisal Value | Disadvantage for MOS |
|---|---|---|
| **Purpose** | The Appraisal Value measures the true worth of the company. (0.5 mark SJ) | MOS is required for external statutory reporting purposes. (0.5 mark SJ) |
| **Impact of Assumption Changes** | Future assumptions are capitalised with an immediate impact, and thus reflects the impact of management decisions. (0.5 mark SJ) | Does not show or tends to be slow in showing the impact of management decisions as changes in assumptions have no immediate profit impact. The effect of changes in assumptions (apart from economic assumptions and those causing loss recognition) are spread over the future life of the profit through the profit margin. (0.5 mark SJ) |
| **Expenses** | Can reflect expected expense savings in the future. (0.5 mark SJ) | Must reflect budgeted expenses over the next year. Longer term expense savings cannot be allowed for until the year they occur. (0.5 mark SJ) |
| **New Business** | Provides management with clear signals of the impact of changes in future sales volumes as these effects are capitalised. (0.5 mark SJ) | Changes in sales volumes will have a small impact on MOS profit (provided the product is not making losses) as the profit is for new business is spread over the life of the policy. (0.5 mark SJ) |
| **Capital Requirement** | Appraisal Value is based on future distributable earnings, which means it allows for the capital needs of the business by using reserves equal to the capital adequacy requirement plus target surplus. (0.5 mark SJ) | Does not reflect the capital needs of the business as uses Policy Liabilities per LPS1.04 which has the effect of smoothing profits. (0.5 mark SJ) |
| **Discount Rate** | Appraisal Value incorporates the required return of the company's shareholders which incorporates the company's risk. (0.5 mark SJ) | Does not reflect the shareholder's risk, instead it uses a risk free rate of a replicating portfolio of assets as set out in the Actuarial Standard LPS1.04. (0.5 mark SJ) |

| | | |
|---|---|---|
| **Cost of Capital** | Reflects company's cost of capital (discount rate – expected investment earning rate).<br>(0.5 mark SJ) | Does not reflect cost of capital as uses a risk free rate not the risk discount rate.<br>(0.5 mark SJ) |
| **Premium Rate Changes** | Can reflect the impact of future premium rate changes.<br>(0.5 mark SJ) | For the inforce business, does not show the full impact of future premium rate changes immediately as these must be spread through the future profit margins.<br>(0.5 mark SJ)<br><br>For new business, premium rate changes will similarly have a small impact on MOS profit as the profit is spread over the life of the policy.<br>(0.5 mark SJ) |
| **Proxy for Price Paid if Company Sold** | If the company were sold in an arm's length transaction, the Appraisal Value is a reasonable proxy for the price paid. Hence an increase in the Appraisal Value is an indicator of good financial management.<br>(0.5 mark SJ) | Not the case for MOS.<br>(0.5 mark SJ) |
| **Other** | Other advantages of the Appraisal Value with an appropriate explanation provided.<br>(0.5 mark SJ) | Other disadvantages of MOS with an appropriate explanation provided.<br>(0.5 mark SJ) |
| **Total Marks** | **Marks as specified above for each point with an appropriate explanation to a maximum of 3 marks SJ.** | **Marks as specified above for each point with an appropriate explanation to a maximum of 3 marks SJ.** |

**Marking Guide**

**Maximum of 6 marks SJ.**

b) and c)

Issues that arise from using the Appraisal Value as a measure of management performance and actions to overcome these issues are as follows:

| b) Issue | c) Action |
|---|---|
| **Includes Capital and Dividends**<br>The change in Appraisal Value includes any capital injection and dividend payments during the year, which will distort profit.<br>(0.5 mark CJ) | Deduct capital injections and dividend payments from the Appraisal Value profit.<br>(0.5 mark CJ)<br>**To a maximum of 0.5 mark CJ.** |
| **Sensitivity to Assumption Changes**<br>Appraisal Value is highly sensitive to changes in assumptions which can have a volatile impact on profit.<br>(0.5 mark CJ) | You cannot avoid the volatile impacts.<br>(0.5 mark CJ)<br>The best you can do is to educate management on the sensitivity to changes in assumptions.<br>(0.5 mark CJ)<br>Provide pre warnings of assumption changes and estimated impacts.<br>(0.5 mark CJ)<br>Other valid points raised with an appropriate explanation.<br>(0.5 mark CJ)<br>**To a maximum of 1 mark CJ.** |
| **No Management Control of Economic Assumption Changes**<br>Change in Appraisal Value will include the impact of changes in economic assumptions such as the risk discount rate (driven by changes in market rates), which management has no control over.<br>(0.5 mark CJ) | Split change in Appraisal Value into:<br>i) internal experience items that management has some influence on such as lapses (retention), claim rates (underwriting and claims management), expenses (budgeting) and sales (marketing).<br>(0.5 mark CJ)<br>ii) external experience items that management has no influence on (economic assumption changes).<br>(0.5 mark CJ)<br>Other valid points raised with an appropriate explanation.<br>(0.5 mark CJ)<br>**To a maximum of 1 mark CJ.** |

| | |
|---|---|
| **Difficult to Understand**<br>The Appraisal Value can be difficult to understand.<br>(0.5 mark CJ) | An initial education program for management.<br>(0.5 mark CJ)<br>Communicate to management regularly during the year on experience and assumption changes.<br>(0.5 mark CJ)<br>After each year's Appraisal Value results provide a presentation, covering reasons for changes in value.<br>(0.5 mark CJ)<br>Other valid points raised with an appropriate explanation.<br>(0.5 mark CJ)<br>**To a maximum of 1 mark CJ.** |
| **Manage Results**<br>There could be temptation to manage the results from period to period by senior management, or pressure to avoid making assumptions changes which result in unnecessary volatility.<br>(0.5 mark CJ) | Actuaries are subject to a professional code of conduct.<br>(0.5 mark CJ)<br>Actuaries need to follow the Institute's guidance note for Appraisal Values.<br>(0.5 mark CJ)<br>Have assumption changes independently peer reviewed (internally or externally). Peer review results.<br>(0.5 mark CJ)<br>Other valid points raised with an appropriate explanation.<br>(0.5 mark CJ)<br>**To a maximum of 1 mark CJ.** |
| **Lack of Resources**<br>There may be a lack of actuarial staff to perform the extra workload on top of current requirements for year end.<br>(0.5 mark CJ) | Recruit additional skilled actuarial staff.<br>(0.5 mark CJ)<br>Review actuarial functions performed to see if sufficient efficiency gains can be achieved to allow the Appraisal Value to be performed by the current actuarial staff.<br>(0.5 mark CJ)<br>Other valid points raised with an appropriate explanation.<br>(0.5 mark CJ)<br>**To a maximum of 1 mark CJ.** |

| | |
|---|---|
| **Timeliness of Delivery of Appraisal Value Results**<br>To produce an Appraisal Value takes a considerable amount of time, which means end of year results may not be available in a timely manner. This is particularly true as Policy Liabilities and other items are required for financial statements at year end.<br>(0.5 mark CJ) | Calculate an accurate Appraisal Value on an earlier date (such as 30 June) and then rollforward this value (including expected changes, experience items and assumption changes) to 31 December.<br>(1 mark CJ)<br>Other valid points raised with an appropriate explanation.<br>(0.5 mark CJ)<br>**To a maximum of 1 mark C**J. |
| **No Interim Results**<br>As the Appraisal Value will be calculated only once a year at 31 December, there is no indication to management on how the company is performing during the year.<br>(0.5 mark CJ) | Calculate Appraisal Values more frequently during the year using a rollforward approach.<br>(0.5 mark CJ)<br>Other valid points raised with an appropriate explanation.<br>(0.5 mark CJ)<br>**To a maximum of 0.5 mark CJ.** |
| **Other**<br>Other valid issues with an appropriate explanation.<br>(0.5 mark CJ) | Valid actions with an appropriate explanation.<br>(0.5 mark CJ) |
| **Total Marks**<br>**Marks as specified above for each point raised with an appropriate explanation**<br>**To a maximum of 3 marks CJ.** | **Total Marks**<br>**Marks as specified above for each point raised with an appropriate explanation**<br>**To a maximum of 5 marks CJ.** |

d)

The expected change in each component of the Appraisal Value from 31/12/2011 to 31/12/2012 is calculated as follows:

| $m | Change in Value of Inforce (VIF) | Change in Value of New Business (VNB) | Change in Adjusted Net Worth (ANW) | Change in Appraisal Value |
|---|---|---|---|---|
| Increase from rollforward to 31/12/2012 | Rollforward at rdr<br>= 127.0 x 0.12<br>= 15.2<br>(0.5 mark KU) | Rollforward at rdr<br>= 155.0 x 0.12<br>= 18.6<br>(0.5 mark KU) | Rollforward at earning rate<br>= 30.0 x 0.055<br>= 1.7<br>(0.5 mark KU) | 35.5 |
| Transfer 31/12/2011 inforce distributable profit for 2012 from VIF to ANW | -26.0<br>(0.25 mark KU) | | 26.0<br>(0.25 mark KU) | 0.0 |
| Transfer 2012 sales value of new business from VNB to VIF | 15.7<br>(0.25 mark KU) | = - 14 x 1.12<br>= - 15.7<br>(0.25 mark KU) | | 0.0 |
| Transfer 2012 sales distributable profit in 2012 from VIF to ANW | -2.0<br>(0.25 mark KU) | | 2.0<br>(0.25 mark KU) | 0.0 |
| Total change in value | 2.9<br>(0.25 mark KU) | 2.9<br>(0.25 mark KU) | 29.7<br>(0.25 mark KU) | 35.5<br>(0.25 mark KU) |

**Marking Guide**

**Marks as specified above for each correct calculation with:**

- **1.5 marks KU for rollforward calculations.**
- **0.5 mark KU for the transfer of distributable profit from VIF to ANW.**
- **0.5 mark KU for the transfer of value of 1 years' new business from VNB to VIF.**
- **0.5 mark KU for transfer of 1 year's new business distributable profit from VIF to ANW.**
- **1 mark KU for calculation of total change in Appraisal Value and its three components.**

**To a maximum of 4 KU marks.**

e)

i)

Impact of $10m target surplus:

Adjusted Net Worth:

- The introduction of a target surplus requirement of $10m will result in an immediate $10m reduction in the adjusted net worth. (0.5 mark SJ)

Value of Inforce:

- The increase in the value of inforce will be less than the $10m reflecting the cost of capital, as the additional $10m of modeled assets will be discounted at the risk discount rate which is at a higher rate than the investment earning rate that can be earned on these additional assets. (1 mark SJ)

Impact on Appraisal Value:

- The overall impact will be a decrease of less than $10m. (0.5 mark SJ)

**Marking Guide**

**Marks as specified above for each point with an appropriate explanation.**

**To a maximum of 2 marks SJ.**

ii)The impact on the Appraisal value can be estimated using the following formula:

Change in ANW ↓ Change in VIF ↓

$$-10 + 10 \times [(1+\text{earnings rate})/(1+\text{risk discount rate})]^{\text{average duration}}$$

$$= -10 \times [1 - (1+\text{earnings rate})/(1+\text{risk discount rate})]^{\text{average duration}}$$

(1 mark SJ)

**Marking Guide**

**Maximum of 1 mark SJ for correct formula.**

**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.**

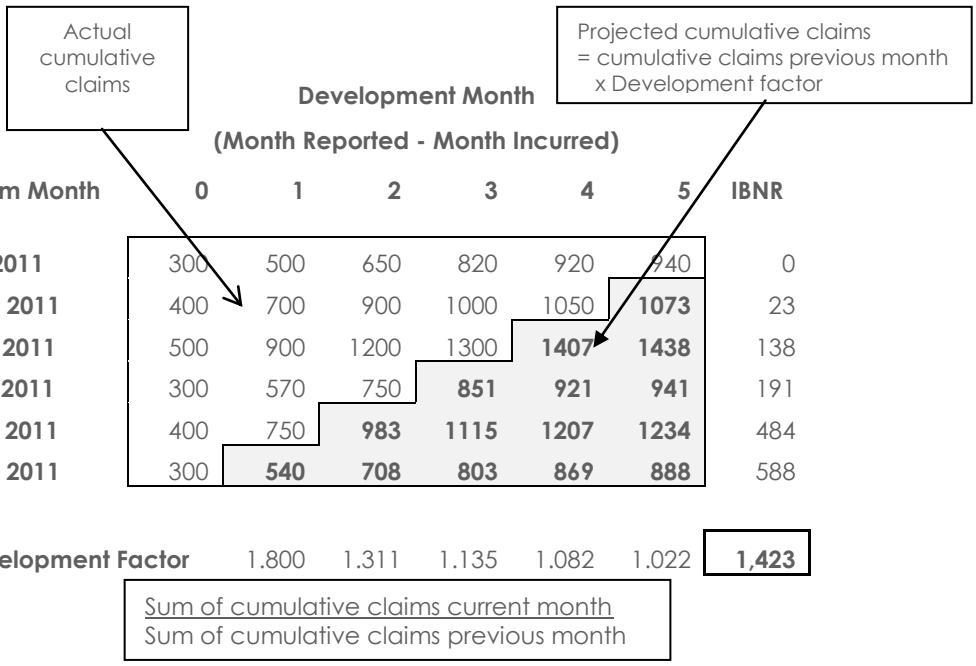
**<u>Ratio Method:</u>**

**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:**




| 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** |

Sum of cumulative claims current month
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 3: SOLUTIONS**

a)

An IBNR Reserve is required for the following reasons:

- A reserve is required so that sufficient assets are built up over time to pay for these claims as they arise. (0.5 mark KU)
- The projection policy liability for YRT and unearned premium reserve for Group Life covers expected claims in the future which have not been incurred yet, but not IBNR claims which have already been incurred. (0.5 mark KU)
- Without an IBNR reserve, you will under-estimate profit as there will always be a claim experience loss from these IBNR claims. (0.5 mark KU)
- There will be a distortion in terms of timing of profits, where large profits occurs when the business grows markedly, but there is no corresponding increase in the IBNR Reserve over the year to delay profit emergence. (0.5 mark KU)
- Any other valid reasons with an appropriate explanation. (0.5 mark KU)

**Marking Guide**

**Marks as specified above for each point with an appropriate explanation.**

**To a maximum of 2 marks KU.**

b)

Differences between the Ratio and Chain Ladder methods are set out in the following table:

| **Point of Difference** | **Ratio Method** | **Chain Ladder Method** |
|---|---|---|
| **Simplicity of Method** | The Ratio method is a simple method to implement as it uses a straightforward formula. (0.5 mark SJ) | The Chain Ladder method is much more complex as it derives development factors for each claim year. (0.5 mark SJ) |
| **Degree of Approximation** | Ratio method is approximate because it uses an average claim ratio and an average delay period. (0.5 mark SJ) | Chain Ladder method is more accurate as it is more aligned to IBNR claims which are spread over a number of months for a particular claim month. (0.5 mark SJ) |
| **Ease of Checking** | IBNR Reserves calculated using the Ratio Method are easier to check as they are a ratio of Annual Premium Inforce. (0.5 mark SJ) | IBNR Reserves calculated using the Chain Ladder method are harder to check because there are more factors at play. (0.5 mark SJ) |

| | | |
|---|---|---|
| **Smoothness of IBNR Reserve** | Assuming claims ratio and average delay assumptions are not changed, the IBNR Reserve is relatively smooth and not volatile. (0.5 mark SJ) | Variations in claims experience over time can cause volatility in the calculation of the IBNR Reserve. (0.5 mark SJ) |
| **Subjective/Prescriptive (or Assumptions/No Assumptions)** | Ratio method is more subjective as it requires assumptions for claims ratio and delay period. (0.5 mark SJ) | Chain Ladder is more prescriptive as no assumptions are required as uses a formula to derive development factors based claims data. (0.5 mark SJ) |
| **Impact of Assumption Changes** | Changes in the claims ratio and average delay period assumptions can increase the IBNR Reserve significantly and thus impact profit. (0.5 mark SJ) | No impact as assumptions are not used. (0.5 mark SJ) |
| **Reflect future changes in claim development** | The ratio method can take into account future changes in claim development by changing assumptions (claims ratio and average reporting delay period). (0.5 mark SJ) | As the Chain Ladder method is based on past claims data it cannot take into account in future changes in claim development. (0.5 mark SJ) |
| **Quickness in reflecting trends in claims** | The claims ratio used to estimate incurred claims is typically based on the experience claims ratio from more than 12 months ago. A shift in claims during recent months is not reflected in the claim ratio. (0.5 mark SJ) | Reflects changes in trend in claims data immediately. (0.5 mark SJ) |
| **Missing Data** | If no data available, can still calculate the IBNR reserve using the ratio method as can rely on other sources than company claims data, such as industry data and advice from reinsures. (0.5 mark SJ) | Sometimes data on date claim incurred and date claim reported are missing or not available, which means the Chain Ladder method cannot be used. (0.5 mark SJ) |
| **Reflects change in size of portfolio** | As calculation is based on Annual Premium Inforce, reflects change in size of portfolio immediately. (0.5 mark SJ) | Can be slow in picking up change in size of portfolio because of the lag in reporting of claims. (0.5 mark SJ) |

| | | |
|---|---|---|
| **Sensitive to delays in reporting group life claims** | Not impacted as uses assumptions. (0.5 mark SJ) | Chain Ladder can be volatile and sensitive for Group Life because of bigger delay in reporting claims. (0.5 mark SJ) |
| **Other valid differences raised** | Appropriate explanation for the Ratio method in respect of any other valid difference. (0.5 mark SJ) | Appropriate explanation for Chain Ladder method in respect of any other valid difference. (0.5 mark SJ) |
| **Total Marks** | **Marks as specified above for each point with an appropriate explanation to a maximum of 3 marks SJ.** | **Marks as specified above for each point with an appropriate explanation to a maximum of 3 marks SJ.** |

**Marking Guide**

**Maximum of 6 marks SJ.**

c), d) & e):

To: CEO
From: Valuation Actuary
Subject: Deferring Impact of IBNR Assumptions to Next Year

This memo provides a response to your question on whether the impact of assumption changes to IBNR Reserve can be deferred to next year. I also recommend changes to processes to avoid surprises such as these happening in the future as well as better communication s strategies.

c) Deferral of Impact of IBNR Assumptions

- In accordance with the professional standards that I must comply with, it would be regarded as unprofessional and a breach of conduct if I deferred the introduction of the assumption changes to next year. (1 mark CJ)
- You should not change your approach just because it will have an adverse impact on this year's profit. (1 mark CJ)
- The auditors will be reviewing the assumptions and would expect the experience analysis to be updated and a review of assumptions to take place as it is three years since the last review. (1 mark CJ)
- Ultimately this is a timing issue as whenever the change in assumptions is made profit will be impacted. (1 mark CJ)
- Other valid points with an appropriate explanation. (1 mark CJ)

**Maximum of 3 Marks CJ.**

d)

Recommendations to Improve Processes

Regular Average Delay Period Assumption Review

- Three years is too long a period to wait between experience investigations on the average delay period because of the large and volatile impact on profit of assumption changes. (1 mark CJ)
- Besides this is not in sync with the experience investigations and assumption reviews for other assumptions, including claim assumptions. (1 mark CJ)
- I propose that the average delay period experience investigation and assumption review be conducted more regularly, say every two years or every year depending on practicalities. (1 mark CJ)
- To give prior warning of potential profit impacts, this experience analysis and assumption review should be conducted earlier in the year. (1 mark CJ)
- Other valid points with an appropriate explanation. (1 mark CJ)

Claim Assumptions

- Given that claim assumptions are reviewed every year, these revised assumptions should be reflected in the IBNR calculation every year. (1 mark CJ)
- Other valid points with an appropriate explanation. (1 mark CJ)

**Maximum of 4 marks CJ.**

e)

Improvements to Communication:

- Provide a presentation to management about the potential volatile impacts of assumption changes on the IBNR Reserve. (1 mark SJ)
- The outcomes of the review of IBNR assumptions should be communicated to senior management as soon as they have been concluded. (1 mark SJ)
- During the year, claims experience should be monitored. Any likely changes in experience and possible changes to assumptions should be communicated to management. (1 mark SJ)
- Other valid communication improvements with an appropriate explanation. (1 mark SJ)

**Maximum of 3 marks CJ.**

I am happy to discuss with you the issues raised in this note.

Yours Sincerely

Valuation Actuary

**Marking Guide**

**Marks as specified above for each point with an appropriate explanation with:**

**Part c):**

- **Maximum of 1 mark SJ for format of memo, including introduction, closing statement and the use of appropriate language (i.e. no jargon).**
- **Maximum of 3 marks CJ for discussion on deferring the impact of the IBNR assumptions.**

**To a maximum of 4 marks (1 mark SJ, 3 marks CJ).**

**Part d):**

- **Maximum of 4 marks CJ for recommendations to Improve processes.**

**Part e):**

- **Maximum of 3 marks SJ for improvements to communication.**

**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 4: SOLUTIONS**

a)

A projection method is used for unit linked business in the following circumstances:

- Liability adequacy test, to test for loss recognition, which requires the calculation of a Best Estimate Liability using a projection method. (0.5 mark KU)
- The calculation of the Management Service Element (MSE) may use a projection method to determine the projected MSE % of FUM based on projection of fees as an AERC. (0.5 mark KU)
- To test that the Management Service Element can be paid from future fee income, which requires a projection of future fees and expenses. (0.5 mark KU)
- To perform an analysis of profit, you need expected cashflows, fees, account balances and policy liabilities. A projection is required to obtain this information. (0.5 mark KU)
- May need to demonstrate or test that the Solvency Liability (which requires a projection) is less than the Minimum Termination Value under the Solvency Standard LPS2.04. (0.5 mark KU)
- May need to demonstrate or test that the Capital Adequacy Liability (which requires a projection) is less than the Current Termination Value under the Capital Adequacy Standard LPS3.04. (0.5 mark KU)
- To calculate a New Business Reserve under the Capital Adequacy Standard LPS3.04. (0.5 mark KU)
- Other valid points with an appropriate explanation. (0.5 mark KU)

*[Note to Markers: No marks awarded for mentioning appraisal value, business planning activities and product development activities as the question specifies that the activities of the actuarial department cover the calculation of Policy Liabilities, Solvency and Capital Adequacy Requirements.]*

**Marking Guide**

**Marks as specified above for each point with an appropriate explanation**

**To a maximum of 3 marks KU.**

b)

i)

Formula for best estimate bonus rate is:

$$\frac{\text{(Policy Liability – Best Estimate Liability) x Current declared reversionary bonus rate}}{\text{1.25 x PV future reversionary bonuses at the current declared reversionary bonus rate}}$$

(1 mark KU)

Or alternatively this can be expressed as:

$$\frac{0.8 \times (\text{Policy Liability} - \text{Best Estimate Liability}) \times \text{Current declared reversionary bonus rate}}{\text{PV future reversionary bonuses at the current declared reversionary bonus rate}}$$

(1 mark KU)

**Marking Guide**

**1 Mark KU for the correct formula above.**

ii)

Negative investment earning rate earned on assets over the year:

- As the Policy Liability (or VSA) calculation is based on cashflow (including investment income), the Policy Liability will decrease because of the negative investment income. (0.5 mark SJ)
- The Best Estimate Liability (BEL) remains unchanged as there has been no change to the assumptions. (0.5 mark SJ)
- PV future profit margins (Policy Liability – BEL) decreases. (0.5 mark SJ)
- With the PV (future reversionary bonuses at the current declared reversionary bonus rate) remaining unchanged because of no change in assumptions, the best estimate bonus rate must fall. (0.5 mark SJ)
- Other valid points with an appropriate explanation. (0.5 mark SJ)

**Marking Guide**

**Marks as specified above for each point with an appropriate explanation**

**To a maximum of 2 marks SJ.**

iii)

Lapse rate assumption decreases:

- Policy Liability at end of year remains unchanged as not impacted by change in lapse assumptions. (0.5 mark SJ)
- BEL increases as policyholder stay on the books longer gaining higher claim payments. This is offset by higher premium payments, but only partially. (0.5 mark SJ)
- PV future profit margins (Policy Liability – BEL ) decrease. (0.5 mark SJ)
- With the PV (future reversionary bonuses at the current declared reversionary bonus rate) increasing because of the decrease in the lapse assumption, the best estimate bonus decreases, reflecting the fact that the lower PV future profit margins must be spread over a longer period. (0.5 mark SJ)
- Other valid points with an appropriate explanation. (0.5 mark SJ)

**Marking Guide**

**Marks as specified above for each point with an appropriate explanation**

**To a maximum of 2 marks SJ.**

c)

Relationship between best estimate bonus rate and declared bonus rate:

- The best estimate bonus rate is a prescribed calculation as part of the policy liability process to ensure a smooth pattern of profit over time, and depends on the size of the policy liability. (0.5 mark SJ)
- Whereas the declared bonus rate is not a prescribed calculation and relies on the judgement of the Appointed Actuary. (0.5 mark SJ)
- Furthermore, the level of retained profits may influence the size of the declared bonus rate, as the distribution of the declared bonus rate will come out of current year's profit and prior year's retained profits. (0.5 mark SJ)
- When the Appointed Actuary recommends a declared bonus rate, the best estimate bonus rate may be taken into account to assess the supportability of the declared bonus rate. (0.5 mark SJ)
- However, there are other factors, besides the best estimate bonus rate, the Appointed Actuary will take into account in determining a declared bonus rate such as: policyholder expectations, equity and the solvency position. (0.5 mark SJ)
- Other valid points with an appropriate explanation. (0.5 mark SJ)

**Marking Guide**

**Marks as specified above for each point with an appropriate explanation**

**To a maximum of 2 marks SJ.**

d)

<u>Reducing Reversionary bonuses</u>

i)

Equity Considerations:

- A reduction in the compound reversionary bonus is a fairly equitable method of distributing negative investment surplus from a fall in asset values across different generations of policyholders. (0.5 mark SJ)
- This is because the fall in assets results in a proportionate fall in asset shares. A uniform decrease in the declared reversionary bonus at 30 June 2012, results in a uniform proportionately lower increase in the value of benefits for all policyholders (or equivalently results in a uniform proportionate decrease in the value of benefits relative to the situation had policyholders received the proposed 4% declared rate at 30 June 2012). (0.5 mark CJ)

**Marking Guide**

**Marks as specified above for each point with an appropriate explanation with:**

- **0.5 Mark SJ for stating reducing reversionary bonus is equitable.**
- **0.5 Mark CJ for explain why it is equitable.**

**To a maximum of 1 mark (0.5 Mark SJ, 0.5 mark CJ).**

ii)

Other Impacts:

Solvency Requirement:

- The fall in assets has weakened the financial position of the company as the buffer between assets and the Solvency Requirement has decreased (or perhaps in an extreme case made the company insolvent). The declared reversionary bonus rates can be decreased to such an extent that the Current Termination Value reduces and the buffer is restored (and in the extreme case restored the company's solvency). (1 mark CJ)

- Other valid points with an appropriate explanation. (0.5 mark CJ)

*[Note to Markers: To get the full 1 mark, the candidates do not need to discuss both situations, when the company is still solvent or insolvent after the fall in asset values.]*

Maximum 1 mark CJ.

Capital Adequacy Requirement:

- The fall in assets has decreased the buffer between the assets and the Capital Adequacy Requirement (and perhaps in an extreme case the company is no longer satisfies the Capital Adequacy Requirement). The buffer is the Shareholder Retained Profits and the PV of future shareholder profit margins. (0.5 mark CJ)

- The Capital Adequacy Requirement decreases with the fall in assets as it is essentially the Capital Adequacy Liability (the policyholder retained earnings plus the policyholder component of policy liability. A decrease in the declared reversionary bonus rate will not affect the buffer, as this will result in a transfer between policyholder retained earnings and the policy liability. (0.5 mark CJ)

- However, the Capital Adequacy Liability may now be below the Current Termination Value. Thus a reduction in declared reversionary bonuses will reduce the Current Termination Value to below the Capital Adequacy Liability and improve the situation (and in the extreme case hopefully restore the company to being capital adequate). (1 mark CJ)

- Other valid points with an appropriate explanation. (0.5 mark CJ)

*[Note to Markers: To get the full marks for each point above, the candidates do not need to discuss both situations, when the company is still capitally adequate or capitally inadequate after the fall in asset values.]*

Maximum 1.5 marks CJ.

Policyholder Expectations:

- Reducing the reversionary bonus rate may not be in line with policyholder expectations. Policyholders expect that the reversionary bonus is stable. Policyholders may fear that this reduction in reversionary bonus rates may be permanent. Policyholders will expect that LONGLIFE will use its financial soundness to insulate against reductions in bonus rates. This could lead to customer complaints and potentially higher lapses.
(1 mark CJ)

- A fall in asset value is not necessarily permanent as investment marks could bounce back. However, reversionary bonuses once declared are effectively guaranteed, so that the lower reversionary bonus rates for that period are locked in. Hence, if the investment markets bounce back, you will need to increase reversionary bonus rates. This causes further instability in declared reversionary bonus rates over time.
(1 mark CJ)

- Other valid points with a reasonable explanation. (0.5 mark CJ)

Maximum 2 marks CJ.

Other:

- Reducing the reversionary bonus rate reduces shareholder dividends for this financial year as these are linked to reversionary bonuses and may not meet shareholder expectations. (0.5 mark CJ)

- Other valid points with an appropriate explanation. (0.5 mark CJ)

Maximum of 0.5 marks CJ.

**Marking Guide**

**Marks as specified above for each point with an appropriate explanation with:**

- **A maximum of 1 mark CJ for Solvency Requirement.**
- **A maximum of 1.5 marks CJ for Capital Adequacy Requirement.**
- **A maximum of 2 marks CJ for Policyholder expectations.**
- **A maximum of 0.5 mark CJ for other impacts.**

**To a maximum of 4 marks CJ.**

<u>Reducing terminal bonuses</u>

iii)

Equity Considerations:

- The terminal bonus scale is usually expressed as a % of the Surrender Value (or % of Sum Insured and Accrued Reversionary Bonuses), where the % increases the longer the policy has been inforce. A reduction in the terminal bonus handles a fall in assets equitably across all generations of policyholders. (0.5 mark SJ)

- This is because the terminal bonus scale would be reduced uniformly across all durations and would reduce the value of benefits uniformly across all policyholders . (0.5 mark CJ)

**Marking Guide**

**Marks as specified above for each point with an appropriate explanation with:**

- **0.5 Mark SJ for describing the terminal bonus and stating it is equiable.**
- **0.5 Mark CJ for explain why it is equitable.**

**To a maximum of 1 mark (0.5 mark SJ, 0.5 Mark CJ).**

iv)

Other Impacts:

Solvency Requirement:

- The company can reduce the terminal bonus immediately to such an extent that it is still in a sound financial position (or perhaps in the extreme situation restore its solvency position if it became insolvent after the fall in assets) as the Solvency Requirement will fall through the fall in the Current Termination Value of terminal bonuses. (0.5 mark CJ)

- Other valid points with an appropriate explanation. (0.5 mark CJ)

*[Note to Markers: To get the full 0.5 mark, the candidates do not need to discuss both situations, when the company is still solvent or insolvent after the fall in asset values.]*

Maximum of 0.5 mark CJ.

Capital Adequacy Requirement:

- As described above in part i), after the fall in assets, the Capital Adequacy Liability may now be less than the Current Termination Value. Reducing terminal bonuses will decrease the terminal bonus component of the Current Termination Value and this will improve the Capital Adequacy position. (0.5 mark CJ)

- Other valid points with an appropriate explanation. (0.5 mark CJ)

*[Note to Markers: To get the full marks for each point above, the candidates do not need to discuss both situations, when the company is still capitally adequate or capitally inadequate after the fall in asset values.]*

Maximum of 0.5 mark CJ.

Policyholder Expectations:

- At the time these products were sold and through the annual benefit statements, policyholders would have been informed that terminal bonuses are not guaranteed and can fluctuate with movements in investment markets. Thus you would expect less policyholder dissatisfaction from reducing terminal bonuses compared to reducing reversionary bonuses. Hence there should be little impact on lapses. (1 mark CJ)

- As the declared reversionary bonus rate remains unchanged, the declared reversionary bonuses remain stable and thus satisfy policyholder expectations. (0.5 mark CJ)

- The non-guaranteed feature of terminal bonuses is well suited to the investment fluctuations of asset values. As the fall in assets is not necessarily a permanent feature, the terminal bonuses would be increased when the market values of assets increase from future improvements in financial markets. (1 mark CJ)

- Other valid points with an appropriate explanation. (0.5 mark CJ)

Maximum of 1.5 marks CJ.

Other:

- Reducing terminal bonuses will reduce terminal bonus paid when a policyholder leaves and this will result in a decrease in shareholder dividends for this financial year and subsequent years as this reduction in terminal bonus rate persists. (0.5 mark CJ)

- As the declared reversionary bonus rate remains unchanged, shareholder dividends based on these bonuses remain stable and thus satisfies shareholder expectations. (0.5 mark CJ)

- Other valid points with an appropriate explanation. (0.5 mark CJ)

Maximum of 0.5 marks CJ.

*[Note to Markers: No marks should be given if the candidate discusses the impact on profit, as a distribution comes out of profit and does not impact current year's profit.]*

**Marking Guide**

**Marks as specified above for each point with an appropriate explanation with:**

- **A maximum of 0.5 mark CJ for Solvency Requirement.**
- **A maximum of 0.5 marks CJ for Capital Adequacy Requirement.**
- **A maximum of 1.5 marks CJ for Policyholder expectations.**
- **A maximum of 0.5 mark CJ for other impacts.**

**To a maximum of 3 marks CJ.**

e)

Reducing terminal bonus is the more effective method as: (0.5 mark SJ)

- Meets policyholder expectations in terms of stable declared reversionary bonuses and the non-guaranteed nature of terminal bonuses. (0.5 mark SJ)

- The non-guaranteed nature of the terminal bonus, means it is more in sync with the non-permanent feature of the fall in assets. (0.5 mark SJ)

- Other valid reasons with an appropriate explanation. (0.5 mark SJ)

**Marking Guide**

**Marks as specified above for each point with an appropriate explanation with:**

- **0.5 mark SJ for stating the terminal bonus is the more effective method.**
- **Maximum of 0.5 mark SJ for reasons.**

**To a maximum of 1 mark SJ.**

**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)**

**QUESTION 5: SOLUTIONS**

a)

A Single Premium Unit-Linked product is an investment contract as there is no transfer of risk. (0.5 mark KU)

The policy liability is calculated on a fair value basis through the profit and loss in accordance with the relevant accounting standard. (0.5 mark KU)

**Marking Guide**

**Marks as specified above for each point with an appropriate explanation**

**To a maximum of 1 mark KU.**

b)

The policy liability is the sum of:

- the Life Investment Contact Liability (LICL) which is subject to a minimum of the Surrender Value. This is the policyholder Account Balance; and (1 mark KU)
- the Management Service Element (MSE) which is the value of deferred fee revenue and deferred acquisition cost where acquisition expenses are those which are incremental and relate to the sale of new business. (1 mark KU)

**Marking Guide**

**Marks as specified above for each point with an appropriate explanation**

**To a maximum of 2 marks KU.**

c)

i)

A range of checks can be conducted based on the data provided as follows.

Check of Fee Income:

- The upfront fee should be equal to the single premium multiplied by the upfront fee rate. 153.730 x 2.5% = 3.843. This is in line with the 3.836 fees shown. (0.5 mark KU)
- The ongoing fee can be calculated as (670 + 153.730 -- 3.836 + 9.265) x 2.0% = 16.583. This is not in line with the reported number of 18.242 and should be investigated. (0.5 mark KU)

Check of Commissions:

- Upfront commission should equal 153,730 x 5% = 7.686. This is in line with the 7.687 in the statements. (0.5 mark KU)
- Ongoing commission should equal (670 + 153.730 -- 3.836 + 9.265) x 0.5% = 4.146. This is very close to the reported figure of 4.128. (0.5 mark KU)

Check Policy Liabilities at end of the year:

Account Balance at end of year:

| | $m |
|---|---|
| Account Balance (start of year) | 670.000 |
| Single Premiums | 153.730 |
| Upfront Fee | -3.836 |
| Policyholder Investment income | 9.265 |
| Ongoing Fees | -18.242 |
| Withdrawals | -94.520 |
| Account Balance (end of year) | 716.398 |

This does not match the actual closing balance of 716.848 and should be investigated.
(1 mark SJ)

MSE at end of year:

| | $m |
|---|---|
| MSE (start of year) | -11.550 |
| Run off of Inforce MSE* | +1.346 (= -11.550 x 11.7%) |
| MSE Inforce (end of year) | -10.204 |
| New Business MSE (= Fees - Acquisition Expenses) | -3.851 (= 3.836 – 7.687) |
| Run off of New Business MSE* | +0.449 (= -3.851 x 11.7%) |
| New Business MSE (end of year) | -3.402 |
| Estimated MSE (end of year) | -13.606 |

*Uses actual lapse rate = 94.52 / (716.398 + 94.52) = 11.7% based on expected account balance at end of year.

or alternatively lapse rate = 94.52 / (716.848 + 94.52) = 11.7% based on actual account balance at end of year.

This is close to the actual MSE of -13.861 at the end of the year.

(1 mark CJ)

Reconcile Cashflow Profit with Fees less Expenses Profit

| **Profit and Loss (Cashflow)** | **$m** |
|---|---|
| Premiums | 153.730 |
| Upfront Commision | -7.687 |
| Ongoing Commission | -4.128 |
| Expenses | -4.472 |
| Withdrawals | -94.520 |
| Policyholder Investment Income | 9.265 |
| Interest on Shareholder Retained Profits | 0.043 |
| Cashflow | 52.231 |
| | |
| Change in Policy Liability | -44.537 (=658.450 – 702.987) |
| | |
| **Profit** | 7.694 |

This does not match Fees less Expenses profit of 8.144 and should be investigated. (1 mark SJ)

Other valid checks with an appropriate explanation. (0.5 mark KU)

**Marking Guide**

**Marks as specified above for each point with an appropriate explanation**

**To a maximum of 5 marks (2 marks KU, 2 marks SJ, 1 mark CJ).**

ii)

Other checks which I would carry out include:

- Reconcile at the end of year, number of units inforce on the administration system, the actuarial extract and the unit pricing system. (0.5 mark SJ)
- Check Opening units inforce + movement in units = Closing units inforce. (0.5 mark SJ)
- Check ongoing fees in Revenue Account matches those deducted in unit pricing system. (0.5 mark SJ)
- Check cashflow items and fees against previous year's figures so as to spot any irregularities in this year's accounts. (0.5 mark SJ)
- Obtain investment return, benchmark returns and asset mix. We can then check if the investment return for each asset sector is reasonable by comparing the actual investment return with the benchmark return. With the asset mix, we can test if the overall investment return earned is reasonable. (0.5 mark SJ)
- Request details of significant unit movement and investment movements which occurred during the year. (0.5 mark SJ)

- Check changes in unit prices is in line with the actual investment earning rate and the ongoing fees (i.e. Unit price at the end = unit price at start x (1+ actual investment earning rate) x (1 – ongoing fees). (0.5 mark SJ)

- Obtain the unit pricing policy and product disclosure statement. The unit pricing policy should be consistent with what is stated in the product disclosure statement and marketing document. Further investigations should be undertaken to ensure that the unit pricing policy is followed. (0.5 mark SJ)

- Other valid checks with an appropriate explanation. (0.5 mark SJ)

**Marking Guide**

**Marks as specified above for each point with an appropriate explanation**

**To a maximum of 2 marks SJ.**

d)

i) Possible reasons for the MSE experience loss include:

- Lower lapses than expected. This means the release of the MSE is lower than expected. (1 mark SJ)

- Actual sales are lower than expected. This means the new business MSE is lower than expected. (1 mark SJ)

- As MSE is expressed as a % of Account Balance, if the actual Account Balance is lower than expected at the end of the year then MSE is lower. This could be due to lower investment earning rates than expected, higher ongoing commission than expected and higher ongoing fees than expected. (1 mark SJ)

- Increase in the expected investment earning from the start of the year to the end of the year. The expected investment earning is used to calculate the AERC, the present value of a future ongoing fees. A change in MSE from the increase in expected investment earning would need to be capitalized, reflected in a decrease in the MSE. (1 mark SJ)

- Other valid reasons with an appropriate explanation. (1 mark SJ)

**Marking Guide**

**Marks as specified above for each point with an appropriate explanation**

**To a maximum of 4 marks SJ.**

ii) Additional information needed to analyse MSE experience loss includes:

- Actual and expected run off of MSE over the year for business inforce at the start of the year. From this you can derive actual new business MSE. (1 mark SJ)

- Any changes in economic assumptions which would have been capitalised as a change in MSE. (0.5 mark SJ)

- Actual and Expected investment earning rate as this affects funds under management and MSE (as a % of Account Balance). (0.5 mark SJ)

- Other valid information with an appropriate explanation. (0.5 mark SJ)

**Marking Guide**

**Marks as specified above for each point with an appropriate explanation**

**To a maximum of 2 marks SJ.**

e) Implications on policy liabilities are as follows:

On MSE:

- The critical issue is every time the MSE is calculated as part of the policy liability, you need to consider if the future revenue is sufficient to recover the existing MSE (the deferred acquisition cost). Hence the MSE balance of $13.9m at the end of the year needs to be recovered from future profits. (1 mark CJ)
- If current circumstances remain unchanged, based on the estimated future fee revenue of $18.2m (per annum), there is around $8m of profits from ongoing fees less expenses and trail commission which should be sufficient to offset the deferred acquisition cost write off in the future. (1 mark CJ)
- As there is no more new business, the business is going to run off. This additional $3m expense will reduce the amount of profits to $5m or less. (1 mark CJ)
- As the additional expense is fixed, this implies at some point in the future when a certain proportion of the business has runoff, the fee may not cover the expenses. (1 mark CJ)
- The future retention rates are important. If the deferred acquisition cost is not likely to be recovered, then this may need to be written off. (1 mark CJ)
- Projections on the current best estimate lapse rates with sensitivities should be run to look into this possibility. (0.5 mark CJ)
- The impact is policy liabilities will increase and this will reduce profit. (0.5 mark CJ)

On LICL (Account Balances):

- The valuation of the investment contract liability may need to done on a sell or offer unit pricing basis. This allows for the fact that there will be net sales of the units and therefore transaction costs will be higher. Currently with an open book, EASYLIFE may be able to net transactions. (1 mark CJ)

Other

- Other valid points with an appropriate explanation. (0.5 mark CJ)

**Marking Guide**

**Marks as specified above for each point with an appropriate explanation**

**To a maximum of 5 marks CJ.**

**END OF PAPER**