INSTITUTE OF ACTUARIES OF AUSTRALIA

2B LIFE INSURANCE **OCTOBER 2008 EXAMINATIONS**

Marking Guide

Level of difficulty.

	Aims	KU	SJ	CJ	Total
1a	1, 2	2			2
1b	1, 9	3			3
1c	2		7		7
1d	2			5	5
2a	10	2			2
2b	1, 3		3		3
2c	1, 11		5		5
2d	4, 9, 11			5	5
3a	4, 9	4			4
3b	2		5		5
3c	2, 4, 12			8	8
4a	1, 2	3			3
4b	7, 8		6		6
4c	7, 8, 12			8	8
5a	4, 11, 13	3			3
5b	4, 12, 13		3		3
5c	4, 9, 13			8	8
5d	4, 12, 13			3	3
6a	5	2			2
6b	2		2		2
6c	5, 11		5		5
6d	4, 5, 9			8	8
		19	**36**	**45**	**100**

INSTITUTE OF ACTUARIES OF AUSTRALIA

Answer all 6 questions.

QUESTION 1 **(17 Marks)**

Scheme Life Limited (SLL) is an Australian life insurer specialising in group life insurances incorporating death, Total and Permanent Disability (TPD) and Group Salary Continuance (GSC) covers.

SLL's assets are invested in cash and short term high quality fixed interest securities.

You are the valuation actuary for SLL.

a) The Financial Controller has asked you why you need to spend time deriving best estimate assumptions as part of the policy liability determination process when the policy liabilities for this business are derived using the accumulation method. What points would you make in response? (2 marks)

b) One of the management accountants has expressed concern that it is very difficult to determine accurate Incurred But Not Reported (IBNR) reserves for group life business. He is concerned that any mis-estimation of IBNR in this year's accounts will distort the total profits ultimately earned by SLL from policies currently in-force. What points would you make in response to his concerns regarding the potential mis-estimation of IBNR and the resulting distortion of total profits? (3 marks)

c) Your actuarial analyst has carried out some verification checks on the Unearned Premium Reserves (UPR) for SLL's in-force business. He has noticed that the earned premiums reported using the UPR as it stands are more than 15% higher than the average of the statistical in-force premiums over the year. What possible explanations are there for this apparent discrepancy, and what possible checks or investigations could you apply to help understand it? (7 marks)

d) The CFO has asked you about SLL's GSC portfolio. He has asked you to comment on how the current Claims In the Course of Payment (CICP) reserves and the reported profits of SLL over the next two years may be affected by:

   i) A recent rapid increase in GSC schemes written by SLL with "to age 65" benefit periods (historically SLL focussed on schemes with 2 year and 5 year benefit periods); and
   ii) A recession in Australia.

What are your responses to the CFO's queries? (5 marks)

Solutions Question 1

a)

- Loss recognition testing still needs to be carried out even if the accumulation method is used. The determination of a Best Estimate loss ratio is required to determine if losses need to be capitalised (i.e. to determine if a deficiency reserve is required)
- The reserve for Incurred But Not Reported (IBNR) and Reported But Not Admitted (RBNA) claims needs to be determined based on best estimate assumptions of expected claims and best estimate assumptions of projected patterns of claims run-off
- For the claims in payment under the Group Salary Continuance (GSC) cover, best estimate assumptions are required for the projected termination rates for the calculation of reserves for claims in payment.

Marking guide:
- **1 mark for noting BE assumptions needed to carry out loss recognition testing**
- **1 mark for noting the use of BE assumptions (in particular claims amounts and run-off assumptions) in the calculation of reserves for IBNR and RBNA**
- **1 mark for noting that BE assumptions of claim termination rates may be required for the calculation of a reserve for disability claims in payment**

To a maximum of 2 marks (KU)

b)

- The reporting of profit is affected by the level of reserves adopted from period to period. Ultimately however this only affects the timing of recognition of profit (i.e. the profits from a block of business are solely determined by the net cashflows arising from that business)
- Mis-estimation of this year's IBNR will eventually emerge as part of future reported profits, but will not affect total profit over the life of the business
- The historic pattern of claim payment based on the experience of SLL as well as the use of published industry averages can help reduce likelihood of significant mis-estimation of the actual amount of IBNR clams

Marking guide:
- **1 mark for noting profits earned are solely determined by net cashflows and that the level of reserves only affects timing of recognition of profit**
- **1 mark for noting any mis-estimation this year will affect future reported profits but does not affect total profit**
- **1 mark for mentioning use of SLL historic claims experience and industry experience reducing the likelihood of significant mis-estimation**

To a maximum of 3 marks (KU)

c)

- The apparent discrepancy could arise from errors such as
    - Error in the unearned premium reserves at the start of the period
    - Error in the unearned premium reserves at the end of the period
    - Administrative error(s) in the receipting or recording of premium payments

    - Error in the data underlying the statistical premiums in-force
- The apparent discrepancy could also arise for legitimate reasons such as
    - A large block of business written and exiting within the period (adding to earned premiums but not affecting statistical premiums at the start and end of the period)
    - Timing differences between the receipt of premiums and the recognition of premium income
    - Catch-ups / corrections of historic premium miscalculations or errors that have been recognised in the current year
- Possible checks / investigations include:
    - Reviewing unearned premium reserve calculations on a scheme by scheme basis
    - Ensuring completeness of UPR calculations for all schemes
    - Co-ordinate a review of reconciliations of premiums received
    - Reviewing accuracy and completeness of data underlying statistical premiums in-force
    - Analysing the effect of any timing differences between receipt of premiums and the recognition of premium income
    - Confirming historic premium errors that have been corrected and recognised in the current year

Marking guide:

- **1 mark for each valid possible "error" explanation to a maximum of 2 marks**
- **1 mark for each valid possible "legitimate" explanation to a maximum of 2 marks**
- **1 mark for each valid check / investigation to a maximum of 3 marks**

To a maximum of 7 marks (SJ)

d)

Increase in "to age 65" benefit period schemes

- Future CICP reserves should grow relatively quickly as more long-term claims come on to SLL's books. However this would not necessarily reduce future reported profits provided the schemes were adequately priced
- There is the potential for increased volatility of reported profits for the next two years arising from this as there is greater uncertainty in estimating the cost of these long term claims
- The shift to longer benefit periods will increase the duration of the CICP reserves, which may lead to greater asset / liability mismatch. If so this may increase the volatility of reported profits over the next two years
- Moving to age 65 benefit period may add to claims expenses which may reduce profit. This increase in claim expenses may be due to the longer average term of the claim (more administration required), possible need to upgrade claims systems / processes and the likely greater focus on rehabilitation programs (early intervention is likely to result in significant cost savings for long term claims)

Recession

- In a recession insured lives may have reduced incentives to come off claim (e.g. due to unemployment). This may lead to a decrease in claim termination rates over the next two years and an increase in CICP reserves
- In a recession insured lives may be more likely to claim (e.g. due to unemployment).

This may lead to an increase in CICP reserves.

- The deterioration in claim termination rates would most likely reduce future reported profits unless the effect was adequately anticipated in pricing the GSC schemes when SLL took them on

Marking guide:

- **1 mark for noting that future CICP reserves should grow relatively quickly as more long-term claims come on to SLL's books.**
- **1 mark for noting increased uncertainty in estimating cost of long term claims may increased volatility of reported profits for the next two years**
- **1 mark for noting potential for higher profit volatility from greater asset / liability mismatch**
- **1 mark for noting potential higher claims expenses and providing a valid reason as to why claims expenses are likely to rise**
- **1 mark for noting that in a recession there may be a deterioration in claim termination rates**
- **1 mark for noting that in a recession there may be an increase in claim incidence rates.**
- **1 mark for noting that this deterioration would most likely reduce future reported profits unless the effect was anticipated in pricing the GSC schemes when SLL took them on**

To a maximum of 5 marks (CJ)

QUESTION 2 **(15 Marks)**

Innovative Life Limited (ILL) is an Australian life insurer specialising in investment linked products for the superannuation market.

You are the Valuation Actuary for ILL.

a) **A new CFO with a background in funds management has been appointed to ILL. She has reviewed ILL's financial statements and asked why ILL must include the value of policyholders' investments on the liability side of the balance sheet, and the assets backing those investments on the asset side of the balance sheet. How would you respond to this question? (2 marks)**

b) **One of the assets policyholders are invested in is an unlisted property trust which represents a sizeable proportion of the Australian Property investment option under ILL's products. At 30 June 2008 the latest valuation available for this trust was six months old due to difficulties in valuing the underlying assets of the trust. What issues arising from this would you need to consider in completing the 30 June 2008 financial statements for ILL? (3 marks)**

c) **ILL recently introduced a new feature to its products. It gave all policyholders an option (which had to be taken up prior to 1 January 2008) to set a floor on the value of their investments, at 20% below the prevailing value of their investments at 1 January 2008. Under this option, ILL guarantees that the value of policyholders' investments will not fall below this floor. Those policyholders taking up the option paid a one-off fee to ILL, and will also be charged a higher ongoing management fee than those policyholders who did not take up the option.**

In the six months to 30 June 2008, investment performance for ILL's investment linked products has been relatively flat. How would you expect the introduction of this option to affect the profit and loss statement of ILL in this six month period? (5 marks)

d) **A large proportion of ILL's policyholders took up the new policy feature. In the six months to 31 December 2008, due to significant falls in investment markets, those policyholders who took out the option are now "in the money". An investment bank has approached ILL about a financial instrument that would provide protection for ILL against further downside movements in investment markets in future years. What issues would need to be considered before this arrangement should be entered into by ILL? (5 marks)**

Solutions Question 2

a)
- Life insurance accounting standard AASB 1038 requires that Life Investment Contract liabilities are to be treated as financial instruments and recognised at fair value
- Life insurance accounting standard AASB 1038 requires that assets backing Life Investment Contract liabilities be shown at fair value
- The AASB takes this view as the assets are held within the life legal entity and hence must sit "on the balance sheet", while investment management firms typically have assets in separate trust structures (where the assets sit on the balance sheet of the trust rather than the balance sheet of the manager)
- Consequently the fair value of policyholders' funds are included on the liability side of the balance sheet, and the assets backing those funds are shown on the asset side of ILL's balance sheet. The treatment between assets and liabilities needs to be consistent in order for the balance sheet to present a valid picture

Marking guide:
- **1 mark for noting AASB1038 requirements about fair value of life investment contract liabilities**
- **1 mark for noting AASB1038 requirements about fair value of assets backing life investment contract liabilities**
- **1 mark for reasonable discussion of the reason the AASB takes this view for a life insurer**
- **0.5 mark for noting that the treatment between assets and liabilities needs to be consistent in order for the balance sheet to present a valid picture**

To a maximum of 2 marks (KU)

[Note to markers: students may refer to AASB 139 in relation to the fair value of financial instruments. This is also acceptable]

b)
- The actuary would need to consider whether the asset valuation to be included in the financial statements is appropriate (and in particular if the assets are included at fair value). Any adjustments considered necessary would need to be reflected in both the Life Insurance Contract Liability as well as in solvency / capital adequacy requirements (where these are published as part of the financial statements)
- The actuary would need to consider whether the valuation unit prices, which are dependent on the valuation of the underlying assets, are an appropriate reflection of the fair value of the Life Investment Contract Liability
- The actuary would need to consider whether the difficulties in valuing the trust have created distortions in unit pricing. If so, it may be necessary to consider whether policyholders (both in-force and exited) have been equitably treated. It may be necessary to establish a provision to compensate policyholders if this has not been the case

Marking guide:
- **1 mark for considering the appropriateness of the valuation of the unlisted property trust, and any adjustments to the life insurance contract liability**
- **1 mark for considering appropriateness of valuation unit prices as these reflect the value of the underlying assets**

- **1 mark for considering whether there have been any unit pricing distortions created from the inability to update the value of the unlisted property trust, and whether a provision to compensate policyholders who have been inequitably treated is necessary**

To a maximum of 3 marks (SJ)

c)

- The ongoing management fee income received by ILL during the period would flow to the profit and loss account
- The one-off option fee is paid by policyholders in return to access a put option on their investment. As this is not an Establishment Fee offsetting acquisition costs as defined in LPS1.04, this fee would also flow to the profit and loss account
- There will also be a profit and loss impact in relation to the Life Investment Contract Liability element of the policy liabilities for this business as this embedded derivative must be valued and allowed for as required by LPS1.04. Note that although the option may be "out of the money" at the moment it very unlikely to have a nil value. Consequently the option value should be recognised as part of the Life Investment Contract Liability
- The third potential effect would be in relation to any costs incurred by ILL in administering and hedging the option (which may or may not be the same as the additional fees charged)

Marking guide:

- **1 mark for additional ongoing management fee income**
- **1 mark for recognition of one-off option fee immediately as this is not an establishment fee offsetting acquisition costs**
- **1 mark for noting the embedded option that has now been granted to policyholders**
- **1 mark for noting that even though it is out of the money it does not have a nil value**
- **1 mark for any additional costs incurred by ILL**

To a maximum of 5 marks (SJ)

d)

- The protection will come at a cost to ILL, most likely to be significant given the poor investment results of ILL's investment linked products over the last year. ILL would need to weigh up the investment bank's proposed charges against other alternatives
- The terms and conditions of the arrangement would need to be carefully scrutinised to test whether the instrument would be effective in protecting ILL against all likely adverse scenarios. If not, ILL would need to consider either additional capital to cover the scenarios which are not protected and / or consider alternative risk management strategies
- The treatment of the instrument under Solvency and Capital Adequacy Standards would need to be considered, in particular to ensure that the instrument is effective in reducing statutory capital requirements under these Standards
- There should also be consideration of the impact of the financial instrument on the level of Target Surplus held by ILL
- The credit standing of the investment bank should be considered, as the instrument could become of considerable value in the event of further adverse market movements

(i.e. an environment where the investment bank itself may be more likely to run into difficulties)

- The potential for a large exposure to the investment bank and consequent inadmissible assets reserve requirements should be considered

Marking guide:

- **1 mark for considering the cost to ILL of this option versus other hedging or risk management alternatives open to ILL**
- **1 mark for scrutinising terms and conditions to test whether the instrument would be effective in protecting ILL against all likely adverse scenarios. If not additional capital and / or alternative risk management strategies may be required**
- **1 mark for considering treatment under Solvency and Capital Adequacy Standards to ensure the instrument is effective in reducing statutory capital requirements**
- **0.5 mark for considering impact of the instrument on the level of Target Surplus held by ILL**
- **1 mark for examining the credit standing of the investment bank**
- **1 mark for considering potential for a large counterparty exposure arising from the instrument which may lead to inadmissible assets reserve requirements**

To a maximum of 5 marks (CJ)

QUESTION 3 (17 Marks)

You are the Appointed Actuary for Grand East Life (GEL), a life insurer operating in a South East Asian country. The life insurance market in this country is relatively new and immature. GEL's main product lines are Whole of Life (WoL) and Endowment Assurances (EA), with each paying cash dividends. Each year the dividend rate is determined at the discretion of the GEL Board (after receiving the advice of the Appointed Actuary), although policies are sold to customers with indicative ranges of the dividend rate they might expect to receive.

GEL's policy liability valuation is based on the Australian Margin on Services methodology, which in turn is used for GEL's profit reporting.

a) GEL's Marketing Manager has said that due to significant competition between life insurers to recruit agents, he would like to increase initial commissions payable to agents from 100% of the first year's premium to 200% of the first year's premium in order to attract and retain the best agents in the market. The CFO has asked you to advise on the implications of such a change on product profitability, future reported profits and capital requirements. (4 marks)

b) For the past three years, GEL has declared cash dividends of 7%, 7.4% and 6.8%. The competitive environment is becoming increasingly tough, with other companies declaring rates in excess of 9% in the last 12 months despite significantly lower investment returns than experienced in the prior three years. A concerned Board member has asked you as the Appointed Actuary what key considerations you will take into account in deciding whether to recommend a cash dividend rate at a similar level to GEL's competitors. What points would you make in reply? (5 marks)

c) After lengthy deliberation, the GEL Board has decided to declare a cash dividend rate of 7.5%, well below expected competitor rates. The CEO has been presented with the idea of offering customers who indicate they intend to leave GEL this year a special "one-off" retention dividend payment of 2% above the normal cash dividend rate. He has asked for your views on this idea and what additional suggestions that GEL could implement to manage customer retention. Draft a memo in response to this request. (8 marks)

Solution Question 3

a)
- Higher costs would, all other things being equal, reduce the total profit emerging over the life of the business
- Under MoS, the policy liabilities for life insurance contracts allow upfront commission costs to be deferred and amortised over the life of the contracts. Future reported profits should therefore reduce to the extent of the higher amortisation charge arising each year from the higher commission costs.
- The only exception to this would be if the higher upfront commission costs cause the portfolio to move into a loss recognition position. In this case, at the time of loss recognition, there would be a one off decrease to reported profit
- Initial capital strain on writing new business would materially increase following the increase in upfront commissions. There may also be further strain from increased volumes of new business arising from increased agents' activity.
- "Second order" effects may include triggering a spiral of increasing commissions in the market or increased churn activity, change in dividends which would have further effects on profitability and capital requirements.

Marking guide
- **1 mark for noting total profit is reduced**
- **1 mark for deferral and amortisation leading to reduction in future reported profits each year**
- **0.5 marks for mentioning that projected reductions in dividends may reduce the reduction in profit**
- **1 mark for discussion of loss recognition impact**
- **1 mark for increased upfront capital strain**
- **0.5 marks for each valid "second order" effect to a maximum of 1 mark**

To a maximum of 4 marks (KU)

b)
The key items requiring the Appointed Actuary's (AA's) consideration are as follows:
- The financial stability / security of GEL should be the AA's primary consideration in considering this issue. If the higher dividend rates threaten the solvency / capital adequacy of GEL then the AA must not recommend these rates
- Ability to access additional capital for GEL should the need arise
- The size of any Investment Fluctuation Reserves that may have built up historically which could subsidise a higher cash dividend this year
- Whether alternative management action (such as expense reductions) are available to mitigate any losses that may arise
- In addition, the reasonable expectations of policyholders would need to be considered in setting the dividend rate (including any disclosures made by agents). If expectations of policyholders of cash dividends are in the order of 9%, the policies may need to be repriced to ensure that the 9% cash dividend is sustainable going forward
- The degree of equity between policyholders needs to be considered. In particular, a one off increase in the cash dividend paid out to all policyholders from the retained surpluses which have been built up over a number of years, may not be fair as new policyholders (who will have not contributed much to the surplus) will receive the same return as policyholders who have funded the surplus for a number of years

Marking guide
- **1 mark for GEL's financial stability / security**
- **1 mark for size of the Investment Fluctuation Reserves (if any)**
- **1 mark for access to additional capital**
- **1 mark for what alternative management action is available**
- **1 mark for policyholders' reasonable expectations**
- **1 mark for equity between policyholders**

To a maximum of 5 marks (SJ)

c)
To: CEO, Grand East Life

From: Actuary

Re: Retention Dividend

I refer to your request for my response regarding the special "one-off" retention dividend that has been suggested to you. I have a number of concerns regarding this suggestion:

First, declaring a higher cash dividend would have led to a significant deterioration in GEL's financial strength. The cash dividend actually declared is much more in line with what GEL can actually afford to credit to policyholders this year. The payment of a retention dividend would effectively partially reverse this.

Second, there are important issues in respect of policyholder equity in this suggestion. Effectively, only those who indicate they will leave GEL will get the retention dividend. It would seem unreasonable for this sub-set of policyholders to benefit whilst those who intended to stay with GEL do not. Apart from the intention to leave there is nothing differentiating these two groups of policyholders, and therefore no basis for what would effectively be differential cash dividends.

Third, given the cash nature of our dividends, there would appear to be nothing to stop policyholders accepting the retention dividend and then leaving GEL anyway. This would only serve to increase our costs without any benefit in terms of customer retention. Alternatively the retention dividend could be open to abuse by agents at GEL's expense.

Finally, the special dividend may be interpreted or misunderstood by customers as a permanent feature of GEL's dividend policy which may create unrealistic expectations in future.

There would appear to be a number of alternative options available to GEL in order to manage customer retention including:
- In our marketing, focus on our prudent financial management and financial security as a selling point rather than just the amount of cash dividend (which may place some of our competitors in financial difficulty)
- Implement internal processes to suggest alternative GEL products to customers who wish to exit

- Only allowing policyholders to receive cash dividends after having a policy for a minimum number of years (as people who have their policies for a short period are generally loss making and hence take away from the funds that can be distributed to other policyholders). It should be noted this may be difficult to sell to the market if it is not used to having restrictions placed on the payment of cash dividends
- Amendment of agent remuneration structures to provide greater incentives to improve customer retention, rather than just a pure focus on upfront commissions

I would be happy to discuss this issue further.

Regards
Actuary

Marking guide

- **1 mark for point about undermining financial security**
- **1 mark for point about policyholder inequity of favouring a subset of policyholders**
- **1 mark for point about potential ineffectiveness of proposal in terms of customer retention**
- **1 mark for the possible abuse of this system by advisors who can advertise to their clients this option of "free money" from GEL**
- **1 mark for flagging the issue that if this offer was made, this may generate an expectation that customers would expect that such an offer would be made each year**
- **1 mark for each sensible suggested alternative up to a maximum of 2 marks**
- **2 marks for non-patronising, professional language and clarity of expression**

To maximum of 8 marks (CJ)

QUESTION 4 (17 Marks)

Mercy Life Limited (MLL) is an Australian life insurer who specialises in retail risk insurance products (death, Total and Permanent Disability (TPD), trauma and income protection). MLL is one of several major players in this market, and has a well known and established brand presence. Over 95% of MLL's sales are generated by independent financial advisers (IFAs), and MLL has a reputation for product design which is responsive to the needs of the market and offers competitive premium rates.

MLL reinsures a portion of their risks to a local reinsurer.

Over the last three years MLL has not launched any new products, but has made numerous minor changes and additions to benefits on existing products and the circumstances under which these will be paid, especially in its trauma covers and income protection covers. Most of these changes have been in response to requests from IFAs distributing MLL's products.

You have recently been employed as the Appointed Actuary for MLL.

a) The Product Manager has explained to you that the recent product changes and additions have involved a "negligible" claims cost. As the incoming Appointed Actuary, what would you consider in setting best estimate claims assumptions in light of these recent product changes and additions?
(3 marks)

b) Each year MLL prepares an Appraisal Value for management purposes. The previous Appraisal Value report for MLL was as at 30 June 2007. What issues would you need to consider from each of the following in determining the Value of Future New Business (VFNB) at 30 June 2008?

i) The continuing trend to make minor changes and additions to benefit design (with no change in premiums) in response to IFA requests;
ii) A shift to a more level commission structure that occurred during the year on new business (previously the commission structure had a high year 1 commission followed by a small trail commission in subsequent years)

(6 marks)

c) The Head of Strategy is working on a major project to examine whether MLL should develop alternative distribution channels for its products, with a view to reducing its use of IFAs. This project is examining a number of options for MLL. The CEO is nervous about the potential impacts of this major change on the Appraisal Value of MLL. Draft a memo outlining how the changes may impact on MLL's Appraisal Value over the next three years. (8 marks)

Solutions Question 4

a)
- Review the pricing basis / assumptions for the changes (e.g. review of Section 116 reports)
- Review any experience that may have emerged to date on the new benefits (although noting this may not be credible)
- Compare against any experience / information that may be available from MLL's reinsurers
- Examine the way that the new features are being used by IFAs in deciding to recommend MLL's products, to see if there is any potential anti-selection risk

Marking guide:
- **1 mark for review of the pricing basis / assumptions**
- **1 mark for review any emerging experience to date**
- **1 mark for comparing against reinsurers' experience**
- **0.5 mark for looking at how new features are being used to assess anti-selection risk**

To a maximum of 3 marks (KU)

b)
Trend of adding new benefits:
- Over time this trend would be expected to erode the profit margins in future new business written (all other things being equal) by increasing expected claims costs. Consideration would need to be give to this "margin squeeze" effect on future new business and what allowance should be made in the VFNB
- Consideration should also be given to additional anti-selection effects arising from these new features over time on the future profitability of new business
- These effects may be potentially offset by improved new business volumes (as MLL's products maintain / increase competitive position in the market). Consideration would need to be given to how much credit could be given to this given other competitors could make similar changes to their products

Level commission
- The cost (or benefit) from the shift in commission structure itself would need to be considered. As the VFNB is calculated using a risk discount rate higher than the investment earnings rate, a more level commission structure would reduce the funding cost associated with higher upfront commissions. This should be reflected in the VFNB calculation.
- The changed commission structure may have an impact on lapse experience by affecting the behaviour of IFAs. In particular there may be reduced incentives to "churn" business which may improve lapse experience (but also reduce new business volumes).
- The overall attitude of IFAs to the change should be considered when assessing future new business volumes and growth

Marking guide:
- **1 mark for "margin squeeze" effect as new benefits gradually increase claim costs**
- **1 mark for consideration of anti-selection effects brought about by the additional features and impact on future profitability**
- **1 mark for consideration of impact on future new volumes**
- **1 mark for consideration of net cost / benefit from change in commission structure**
- **1 mark for consideration of impact on lapse rates / churning behaviour from IFAs**

- **1 mark for consideration of attitude of IFAs in assessing future new business volumes and growth**

To a maximum of 6 marks (SJ)

c)

To: CEO, Mercy Life Limited

From: Actuary

Re: Potential AV Impact of Development of New Distribution Channel(s)

The development of new distribution channel(s) for MLL to reduce its reliance on IFAs could affect MLL's Appraisal Value (AV) over the next three years in several ways.

The most significant effects will likely be in the Value of Future New Business (VFNB) component of the AV. The following areas should be considered which impact on VFNB:

- The first area to consider is the likely impact on future new business volumes. Particularly in the early years there is a risk that new sales volumes from the new distribution channel(s) would not be sufficient to replace any lost IFA sales. If this is the case there would be a negative effect on VFNB. The overall AV will also grow more slowly over the next three years if sales are lower than in previous years.
- The second area to consider is longer term new business volume growth. The relativity between the growth available via the new distribution channel(s) in the longer term versus the "natural" growth available from IFAs will be a key determinant in whether the Value of Future New Business is increased or decreased.
- A third area to consider is the relative costs of the alternative distribution channel(s) compared to the IFAs. The ultimate "cost per sale" relativity between the two will be affected by MLL's effectiveness in developing the new distribution channel(s)
- Finally, the development of new distribution channel(s) may necessitate a change in MLL's product suite to suit the new channel(s). The relative profit margins in the current products versus any new products will also impact on the VFNB.

In addition to the above the following additional factors may arise that would impact on the AV over the next three years:

- The shift may lead to a one off or short term "shock lapse" effect on MLL's business, if IFAs place their business with other life insurers. Such a shock lapse effect would reduce the Value of In-Force (VIF) component of the AV
- The lapse experience of business sourced through other distribution channels may be different to that of business sourced from IFAs. Over the next three years this would be reflected in the lapse assumptions used to determine MLL's AV

In summary, whilst further detail and analysis is required to assess the impact of the change in distribution strategy on MLL's AV, there are a number of very important areas listed above that could have a material bearing.

I would be happy to discuss this memo further at your convenience.

Yours sincerely

Actuary

Marking guide:

- **1 mark for discussion of future new business volumes, particularly over the next three years where there may be insufficient new business from the new distribution channel(s) to replace any lost sales from IFAs**
- **1 mark for discussion of future new business growth, and assessment of growth available to MLL via the new distribution channel(s) versus the current growth in IFA market**
- **1 mark for discussion of relative distribution costs, and impact on VFNB**
- **1 mark for discussion potential shift in product suite, and the relative margins available**
- **1 mark for discussion of one off / short term "shock lapse" effect on VIF if IFAs move their business from MLL**
- **1 mark for discussion of longer term lapse experience on business sourced via the new distribution channel(s) versus IFAs**
- **2 marks for use of non-technical, professional language and style, and balanced approach to the response**
- **1 mark for any other relevant points as determined by markers**

To a maximum of 8 marks (CJ)

QUESTION 5 **(17 Marks)**

Edge Life Limited (ELL) is a life insurer operating in the mythical country of Luranda. ELL has two statutory funds. ELL sells stepped premium life insurance from Statutory Fund 1 (SF1) which offers guaranteed renewability but where the premium rates may be changed at any time. ELL also sells investment linked business from Statutory Fund 2 (SF2) from which ELL derives management fee income, but policyholders bear the investment risk. ELL has historically adopted a reasonably aggressive investment policy within its statutory funds, with a significant proportion held in growth asset classes.

In Luranda, life insurers must meet Minimum Regulatory Capital (MRC) requirements. Luranda's MRC requirements are based on the Australian Capital Adequacy Standard.

a) **The MRC position of ELL's two statutory funds at 30 June 2008 is set out in the table below. From what you know of ELL's business, why might the MRC ratio be so different for the two statutory funds?** **(3 marks)**

30 June 2008	**SF1**	**SF2**
Termination Value (TV)	6,105	1,774,983
Other Liabilities (OL)	11,348	46,479
MCR Reserve	2,354	9,046
Total MCR	**19,807**	**1,830,508**
MCR Reserve as % (TV + OL)	**13.5%**	**0.5%**

b) **It is now 30 September 2008. There has been a marked deterioration in ELL's capital position since 30 June 2008, which now only covers 85% of ELL's Target Surplus level. A concerned actuarial student who works for you has stated that "since ELL has breached its Target Surplus minimum, it must take immediate action to restore its capital position". Explain (with reasons) whether or not you agree with the actuarial student's statement.** **(3 marks)**

c) **Further investigation reveals that the deterioration in ELL's capital position has been largely attributable to poor investment returns on capital in the statutory funds, elevated marketing expenditure in the pursuit of rapid business growth, and a tropical cyclone in July 2008 which resulted in a surge of death claims. The CFO has proposed four alternative initiatives that he thinks would assist in restoring ELL's capital position:**

- **i) Seek a capital injection from the parent company;**
- **ii) Sell all investments and only invest in cash;**
- **iii) Increase premium rates on all insurance products and management fees on investment linked products by 20%;**
- **iv) Close ELL to new business.**

Explain the potential impact of each of the above initiatives on ELL's current capital position and future capital outlook. (8 marks)

d) **Further investment losses in the December 2008 quarter lead to ELL only being able to cover 50% of its Target Surplus level by 31 December 2008. ELL's senior management team decide to sell all investments and only invest in cash and also maintain the elevated level of marketing expenditure to ensure the company keeps growing. Based on this course of action, your capital forecasts indicate that ELL's capital position will remain at around 85% of ELL's Target Surplus level (after allowing for the changed investment strategy) over the next two years. What advice do you think ELL's Board should receive in respect of this forecast capital position? (3 marks)**

Solutions Question 5

a)
- ➢ Capital margins on the termination value (i.e. capital requirements in excess of the termination value) would be a significant component of the MCR Reserve for SF1. The margins on the termination value typically range from 10% upwards
- ➢ The resilience reserve for SF1 is also likely to be sizeable relative to the termination value and other liabilities. This is because these are likely to be short term liabilities, whilst a significant proportion of assets are held in growth asset classes
- ➢ The MCR Reserve for SF2 would most likely be dominated by the investment linked margin, which is a relatively small % of the termination value compared to the margins on risk business termination values

Marking guide:
- **1 mark for discussion of margins on termination value for SF1**
- **1 mark for resilience reserve discussion for SF1**
- **1 mark for investment linked margin for SF2 being relatively small in % terms**

To a maximum of 3 marks (KU)

b)
- ➢ The intention of Target Surplus is to reduce the probability of breaching MCR requirements to a level acceptable to the Board
- ➢ From time to time it should therefore be expected that adverse fluctuations in experience can lead to ELL's capital position falling below Target Surplus
- ➢ Target Surplus should therefore not be seen as a second minimum capital level (above the MCR) that ELL should always seek to maintain. As a result it is not *necessarily* the case that immediate action to restore ELL's capital level is required

Marking guide:
- **1 mark for noting intention of ELL's Target Surplus**
- **1 mark for noting that it should be expected ELL's capital position will fall below Target Surplus from time to time in light of adverse fluctuations in experience**
- **1 mark for noting that Target Surplus should not be seen as a second minimum (above the MCR) on the capital level that ELL should maintain at all times**

To a maximum of 3 marks (SJ)

c)
Capital injection
- ➢ This would result in a short term improvement in ELL's capital position and is an appropriate response to the catastrophe event
- ➢ However as it does not address some of the underlying drivers of the deterioration (high expenses and investment earnings volatility) it may not be a solution to ELL's future capital position

Liquidate shareholder investments to cash
- ➢ In the short term this should result in a reduction in ELL's resilience reserves which would improve its capital position
- ➢ This would significantly reduce investment earnings volatility for ELL, which should result in improved stability in ELL's future capital position

Price increases

- The price increases themselves will increase ELL's revenues. However it will take time for this to have a significant effect on ELL's capital position.
- Such a price increase may result in a "shock lapse" event for ELL which would in turn lead to a short term improvement in ELL's capital position as capital is released from this business. However ELL may be selected against as those lives that will more likely accept the premium increase are likely to be the less healthy lives (who may be unlikely to be accepted for equivalent cover elsewhere), which will have adverse longer term consequences
- It may also reduce ELL's competitive position in the market, dampening sales growth but thereby reducing capital strain arising from writing new business
- The outlook for ELL's capital position would depend on whether the price increases offset the loss in business volumes

Close ELL to new business

- The capital strain associated with writing new business would be diminished, leading to a short term improvement in ELL's capital position
- Whilst this would address the issues arising from rapid growth and high marketing costs, it is clearly a drastic course of action and effectively means moving ELL into a run-off scenario. Under such a scenario, the ability of ELL to cover fixed overhead expenses given reducing premium volumes will become a significant issue

Marking guide:

- **1 mark for capital injection improving short term capital position, but not addressing all the drivers of the recent capital deterioration and therefore not necessarily addressing ELL's future capital position**
- **1 mark for asset liquidation allowing a reduction in resilience reserves and short term improvement in capital position**
- **1 mark for asset liquidation reducing future investment earnings volatility which would improve stability in ELL's future capital position**
- **1 mark for price increases in themselves having a delayed positive effect on ELL's capital position**
- **1 mark for price increases potentially causing a shock lapse event which would lead to a short term improvement in ELL's capital position**
- **1 mark for price increases potentially dampening sales growth which would reduce capital strain and improve ELL's capital position**
- **1 mark for price increases effect on future capital position depending on whether higher revenues offset loss of business volume**
- **1 mark for closure to new business removing all new business strain leading to a short term improvement in ELL's capital position**
- **1 mark for closure to new business effect on future capital position depending on run-off of the existing book**

To a maximum of 8 marks (with a maximum of 2 marks for each part of the question) (CJ)

d)

- The capital forecast implies a longer term capital position below ELL's current Target Surplus policy. The Board would need to be advised that running ELL at this level of capital means the probability of breaching ELL's MCR requirements is effectively higher than the previous Target Surplus level

- In order to assist the Board in making this decision, advice around the new probability of breach would be required and what this means in practical terms (e.g. scenarios that would lead to a breach of the MCR under the new Target Surplus level)
- The Board should also receive advice about other management actions that are available and the capital implications under these scenarios to provide a range of options for the Board

Marking guide:

- **1 mark for advice concerning the new probability of breach implied**
- **1 mark for advice to help Board understand what this means in practical terms**
- **1 mark for advice concerning other management actions available and the capital implications under these scenarios**

To a maximum of 3 marks (CJ)

QUESTION 6 (17 Marks)

Stream Life Limited (SLL) is an Australian life insurer. Five years ago SLL entered the immediate annuity market, specialising in lifetime annuities with both fixed and CPI indexed payments. These annuities are sold by advisors who receive an initial commission payment.

SLL reinsures all of its immediate annuity payments beyond 20 years' duration. SLL has managed to obtain investment assets that provide a very close cashflow match to the expected immediate annuity payments up to 20 years' duration. The vast majority of these assets are corporate bonds.

a) The most recent analysis of profit for SLL's immediate annuity business for the year ended 30 June 2008 shows a large investment experience loss item. What are the most likely reasons for the large investment experience loss item given the information about SLL's investment strategy described above? (2 marks)

b) The Financial Controller has asked you about creating a product whereby annuitants can reinvest their annuity payments into an investment linked option. He has asked whether the profits arising from the investment linked option could be used to offset any potential loss recognition that may arise in future from the immediate annuity portfolio. What points would you make to the Financial Controller in response? (2 marks)

c) The number of annuitants dying during the year has been markedly lower than implied by the previous valuation mortality assumptions. How would you expect this to emerge in the Analysis of Profit, and how would you expect this to affect the Present Value of Future Profit Margins for the immediate annuity business? You should assume that new business written during the year had positive profit margins. (5 marks)

d) The Product Manager has approached you with a proposal for which he is seeking your advice. He has noted that with interest rates rising over the last 12 months, investment yields on fixed interest securities are now relatively strong. He believes this provides an excellent opportunity to recapture from the reinsurer the immediate annuity liabilities beyond 20 years' duration, and to also cease reinsuring future new business. What are the key issues that would need to be considered in examining this proposal? (8 marks)

END OF PAPER

Solutions Question 6

a)

- The increases in credit spreads on SLL's corporate bond assets during the year was higher than the increase in credit spreads applicable to the discount rate used to value the annuity liabilities
- A significant default event in SLL's corporate bond portfolio
- Since SLL will need to hold total assets for this block of business in excess of the policy liability (i.e. Capital Adequacy requirement), a movement in interest rates (in this case an increase) can result in a greater decrease in asset values than the liabilities
- As the asset and liability cashflows are well matched, it is unlikely that changes in interest rates were a significant contributor to the investment experience profit

Marking guide

- **1 mark for increases in credit spreads on SLL's corporate bond assets higher than the increase in credit spreads applicable to the discount rate used to value the annuity liabilities**
- **1 mark for a significant default event(s) in SLL's corporate bond portfolio**
- **1 mark for noting that excess assets over liabilities can result in an investment loss**

To a maximum of 2 marks (KU)

b)

- The question is effectively asking whether the immediate annuity portfolio can be combined with the investment linked product in respect of profit reporting
- The customer is the same, and there is a link between the annuity payments and the funds that would be invested in the investment linked product
- However LPS1.04 specifies that Related Product Groups be a grouping of products where those products are considered by the Actuary to exhibit benefit characteristics and pricing structures sufficiently similar as to justify grouping for the purposes of profit margin calculation, loss recognition or reporting. Immediate annuities and an investment linked product do not meet this criteria for grouping.

Marking guide

- **1 mark for noting the immediate annuities and investment linked product are separate products even though the same customer is involved and there is a link between the annuity payments and the funds that would be invested**
- **1 mark for noting definition of a Related Product Group and that immediate annuities and investment linked products are not sufficiently similar to be grouped together**

To a maximum of 2 marks (SJ)

c)

- There would be more annuity payments made during the year than assumed. This should emerge as an experience loss in the analysis of profit
- Lower than expected mortality means there would also be a higher liability for future annuity payments than expected. This should also emerge as an experience loss in the analysis of profit
- There would also be an offsetting experience profit as the implied DAC runoff would be better than expected with lower mortality

- The present value of future profit margins (PVFPM) should increase from the previous valuation when calculated using the previous valuation assumptions and profit margins carried forward, as the value of annuity payments will be higher than expected
- If the annuitant mortality assumptions are revised downwards in light of experience, the PVFPM should decrease accordingly

Marking guide

- **1 mark for experience loss in AoP from higher annuity payments during the year**
- **1 mark for experience loss in AoP from higher liability for future annuity payments**
- **1 mark for experience profit in AoP from lower DAC runoff from lower mortality experience**
- **1 mark for PVFPM higher than expected using previous valuation assumptions and profit margins**
- **1 mark for PVFPM would reduce if mortality assumptions revised downwards in light of experience**

Note: answers suggesting the impact of a change in mortality assumptions would emerge in the analysis of profit should be noted by markers
To a maximum of 5 marks (SJ)

d)

- The recapture will involve SLL assuming liabilities for annuity payments beyond 20 years' duration. In return SLL would need to be paid by the reinsurer. The price to be paid by the reinsurer will be a critical factor in determining the viability of the recapture
- In recapturing these liabilities, SLL will retain significant annuitant longevity risk. SLL will need to consider whether it has sufficient capital resources to support this risk
- SLL will need to source appropriate assets to back the long term liabilities. Given the relative shortage of assets of suitable cashflow duration beyond 20 years, SLL will need to consider whether the higher yields currently available on assets are sufficient to offset the costs of any potential cashflow mismatch and / or reinvestment risk
- SLL will also need to consider whether the credit quality of available long term assets is suitable having regard to SLL's capital resources
- SLL will need additional capital to support investment, credit and reinvestment risks on the liabilities to the extent matching assets are not available. SLL will need to consider whether it has sufficient capital resources to support this risk
- The much longer liability duration could potentially increase the volatility of reported profits, especially if close cashflow matching cannot be achieved. SLL will need to consider the impact of this increased volatility on its stakeholders
- There would potentially be an impact on SLL's Target Surplus policy and level given the higher level of risk being undertaken
- The impact on future annuity pricing would need to be re-assessed. In particular the cost of reinsuring the tail would need to be compared to the costs (including capital costs) of retaining the tail. Pricing may need to be amended to ensure adequate returns are generated on the new level of supporting capital

Marking guide

- **1 mark for the price that the reinsurer will pay to SLL for the recapture**
- **1 mark for retaining of significant annuitant mortality risk and ensuring SLL has sufficient capital to support this**
- **1 mark for assessing ability of SLL to source appropriate assets to achieve reasonable cashflow matching and ensure reinvestment risk remains at a reasonable level**
- **1 mark for considering whether available assets are of suitable credit quality having regard to SLL's capital resources**
- **1 mark for consideration of additional capital to support residual investment, credit and reinvestment risks and whether SLL has the capital resources to support this**
- **1 mark for assessment of increased profit volatility and impact on SLL's stakeholders**
- **1 mark for consideration of impact of the change on SLL's target surplus policy and level given the higher level of mortality and investment risk being undertaken**
- **1 mark for consideration of impact on future annuity pricing**
- **1 mark for any other relevant points as determined by markers**

To a maximum of 8 marks (CJ)

