QUESTION 1 MARKING GUIDE

a)

i)

From: Valuation Actuary, AUSLFIE

To: CFO, AUSLIFE

Subject: Valuation method for BIGCO scheme

Dear CFO,

In response to your query, I recommended using the **accumulation approach** for valuing the policy liabilities for the BIGCO scheme because, compared to the projection approach:

- It is simpler and more cost efficient to produce; and
- It is not expected to result in a materially different result (so is allowed under prudential standards as an alternative to the projection approach);

The primary reasons why we are able to get comfortable that the result would not be materially different are:

- The acquisition expenses are relatively small (in relation to the first year's premium); and
- The duration of the liabilities is relatively short (the contract is no more than 3 years in this case).

Both of these factors imply that there should not be large effects from discount rate changes nor lapse assumption changes (which may come through in the case of a projection approach which wouldn't come through an accumulation approach).

Regards,

Valuation Actuary

Marking Guide

If accumulation approach recommended:

- **1 mark for a recommendation with simplicity as the primary rationale**
- **1 mark for mention of importance of not producing a materially different result compared to the projection approach**
- **1 mark for explaining why a materially different result should not occur in this instance (0.5 marks if recommendation is supported by relevant reasons, but not linked to being materially similar to the projection approach)**
- **1 mark for language and format appropriate for an e-mail to the CFO.**

Up to 4 marks

If projection approach recommended:

- **1 mark for justifying why a projection approach should be used over an accumulation approach.**
- **1 mark for language and format appropriate for an e-mail to the CFO.**

Up to 2 marks

ii)

Policy liability at outset = UPR – DAC

For the Lump Sum RPG = \$12.5m – \$0.75m = 11.75m

For the GSC RPG = \$12.5m – \$0.75m = 11.75m

(At the outset no claims have occurred so no claim reserve is required.)

Marking Guide

- **1 mark for correct approach and answer for each RPG**

Up to 2 marks.

b)

i)

The pricing assumptions are recommended for **termination**, as no experience (industry or BIGCO) indicates the pricing assumptions are not appropriate.

For **incidence**, it is recommended the pricing assumptions be is strengthened by 30% reflecting the internal and industry experience. An argument exists to increase the assumption beyond 30% given the adverse industry trend (as BIGCO's study is only for 9 months – further deterioration could have occurred), however it is recommended 30% be adopted this year. This should be monitored closely over the following year.

Marking Guide

- **0.5 marks for no change to termination assumption.**
- **1.5 marks for appropriately changing and suitably justifying the claims incidence assumption:**
  (0.5 marks awarded for stating a recommendation; 1 mark in justifying why this rate was chosen <u>using both pieces of information</u> (internal experience <u>and</u> industry experience)).

Up to 2 marks.

ii)

Outflows – Inflows

= Expected Claim Payments for New Claims + Expected Claim Expenses + Expected Maintenance Expenses – Expected Premiums

= 105%* $10m*130%*2 + $3m/2*2 - $25m/2*2

= 105%*$26m - $22m

= $5.3m

Marking Guide

- **2 marks for correct calculation and overall answer (in Word document or Spreadsheet), deduction 0.5/1 marks for each minor/major mistake**

  Up to 2 marks

iii)

<u>GSC RPG</u>

Under the accumulation approach, and if loss recognition did not occur, then the

Policy Liability = UPR – DAC + CICP (incl. claims handling) [no IBNR or RBNA]

= 0 - $1.5m*50%*(1-1/3) + 105%*$10m*130%*[7/12]

= -$0.5m + $7.9625m

= $7.46m

[7/12 represents that on average 1 month of waiting period and 5 months of payments have been made as of the end of the first year, leaving 7 months of payments left for claims incurred in the first year.]

[Equal credit given for using 6.5/12, or similar, with appropriate justification].

However, the positive value in part ii) indicates that the future premiums are insufficient to cover the future new claims and expenses.

This implies that the GSC RPG is in loss recognition and as such the result from the normal accumulation formula cannot be used.

Instead, the accumulation approach formula becomes:

Policy Liability **for the GSC RPG** = UPR + CICP +PDR (Premium Deficiency Reserve) [no IBNR or RBNA]

Where:

UPR = 0

CICP (incl. claims handling expenses) = 105%* $10m*130%*[7/12]

= $7.96m

PDR equals the value from part ii)

Policy Liability = 0 + $7.96m + $5.3m

= $13.26m

Note that the outstanding DAC does not feature in the revised formula as it is now unrecoverable.

The PDR reserve represents the future new claims and expenses that cannot be covered by the future premiums.

If however there was sufficient premium to cover both the future new claims and expenses, and the unrecovered DAC then the normal formula applies. If premiums are only available to cover a portion of the unrecovered DAC then the DAC needs to be reduced to the amount that can be recovered.

It is important when using an accumulation method to consider the sufficiency of the premium and the recoverability of any DAC.

<u>Death RPG</u>

Policy Liability = UPR – DAC + IBNR [no RBNA]

= 0 - $1.5m*50%*(1-1/3) + $10m*10%

= -$0.5m + $1m

= $0.5m

Marking Guide

- **2 marks for recognising that the GSC RPG is in loss recognition and that the answer to part ii) is the additional reserve that needs to be held.**
- **2.5 marks for calculating the policy liability for the GSC RPG (0.5/1 mark deduction for each minor/major mistake, including a DAC in the formula is a one mark deduction).**
- **1.5 marks for calculating the policy liability for the Death RPG.**
  Up to 6 marks

c)

i)

AUSLIFE profit for GSC RPG = premiums – claims paid – expenses – increase in policy liabilities

= $12.5m - $10m*[5/12]*130%*105% - $3m*50% - $1.5m*50% - ($13.26m – 0)

= -$8.70m

AUSLIFE profit for Death RPG = premiums – claims paid – expenses – increase in policy liabilities

= $12.5m - $10m*90% - $3m*50% - $1.5m*50% - ($0.5m – 0)

= $0.75m

Total AUSLIFE profit = -$8.70m + $0.75m + $48m = $40.05m

Marking Guide

- **1 mark for correct profit formula (deduct 0.5 marks for each minor error, e.g. wrong sign for an item, not detailed enough, subject to a floor of 0)**
- **1 mark for correct application of formula for GSC RPG**
- **1 mark for correct application of formula for Death RPG**
- **1 mark for aggregation of two RPGs along with remaining business per the table**

Up to 4 marks

ii)

It is deemed appropriate to have two RPGs in this instance because the nature of the risk for each benefit component is very different between Death and GSC.

One argument for a single RPG would be that the pricing structures between the two benefit components are not materially different, reflecting that:

- Pricing is likely driven by negotiations at BIGCO level, and not more granular than that.
- There is a degree of cross-subsidisation between the two benefit components.

Marking Guide

- **1 mark for reason for separate RPGs**
- **1 mark for a sensible argument for a single RPG (0.5 marks if argument is not clear/complete)**

Up to 2 marks

d)

i)

In light of the developments over the past 12 months in relation to the BIGCO scheme, I make the following recommendations to improve the profitability over 2018:

1) Frequent monitoring of experience for BIGCO during the year. This is important to give an earlier warning to senior management on profitability implications than what was the case for the current year.

2) Increased focus on the claims management following the claims lodgment including rehabilitation effort to help claimants return to work. While this may incur extra expense for AUSLIFE, it is expected that a higher termination rate of open claims can significantly improve the profitability of the GSC business. Therefore increased claim management effort is expected to give rise to higher claims termination.

3) Source quotes for reinsurance in respect of the existing BIGCO scheme and if quotes are reasonable then proceed with reinsurance. This is to reduce risk for AUSLIFE from any future adverse experience developments.

Marking Guide

- **1 mark for each sensible recommendation which will result in a suitable outcome (0.5 marks if ambiguous).**
- **1 mark for associated explanation of what each recommendation is expected to achieve**
  Up to 4 marks

ii)

The following recommendations are made to the Board in relation to the group scheme tender process:

1) Conduct a pricing review ahead of any future new schemes for which AUSLIFE wishes to tender for, and ensure such pricing allows for cost of reinsurance. Such a review pricing should improve the profitability and more specifically if pricing is uncompetitive, taking into account cost of reinsurance, then this may indicate to AUSLIFE that it is more appropriate not to take on the new Group business at all. Also consider not guaranteeing the premium rate for 3 years (i.e. allow more frequent repricing).

2) When required to submit a tender response well in advance of the commencement date, include a clause that allows for the premium to be increased if experience deteriorates by more than a specified amount.

Marking Guide

1.5 marks for each sensible, appropriately described recommendation which can be implemented at tender time and reduces the risk of losses under a new scheme (0.5 marks if recommendation relevant, but does not fit these criteria)

Up to 3 marks

END OF MARKING GUIDE QUESTION 1

QUESTION 2 MARKING GUIDE

(a)

The random and future stress margins are not prescribed by the Prudential Standards. The appointed actuary must determine the appropriateness of stress margins regarding the relevance to the business and to achieve a 99.5% probability of sufficiency. We can therefore expect there will be differences across the industry. The stress margins we have proposed are higher than other companies with similar business size. These margins are reasonable because:

- The level of maturity – other companies will have some historical experience compared to ABC Life. Given the lack of internal experience for setting of pricing and valuation assumptions, the possible deviation from the BE assumptions is relatively larger when compared to other companies for the purpose of determining the future stress. As a result of this, the future stress for ABC is currently higher compared to many of our peers.
- Quality of experience studies and analysis. ABC Life doesn't yet have processes and systems in place to facilitate accurate experience studies, whereas the comparable peers likely do. ABC Life's underwriting and claims management processes are untested in practice. These may not deliver the expected experience that the assumptions have been based upon. Again the future stress will be higher compared to our peers whose processes have been refined over a number of years as their staff have gained experience.
- Uncertainty over volumes and mix. ABC Life has not yet written the policies that would make it a comparable size to the others, hence there is uncertainty around attaining this which is reflected in the margins.
- For random stress, the stress margin can be impacted by the reinsurance arrangement that ABC Life implemented for the risk business. In this case a quota share arrangement implemented for our retail risk does not reduce the volatility of claims caused by large sum-insured like what surplus reinsurance can do. This means that the skewness of our claims distribution will result in a higher random stress margin.
- There are many other factors that contribute to the stress margin such as the distribution of sum insured which is different for each company and impacts the random stress, while view on future trend can be different, resulting in different future stress.

Marking Guide

- **1 mark for each sensible reason which links to why ABC Life would have higher margins**
  Up to a maximum of 2 marks for Random Stress
  Up to a maximum of 2 marks for Future Stress
- **Up to 1 mark for appropriate language**

  Up to 5 marks

(b)

- The prudential capital standards do indeed allow for a diversification benefit between insurance and asset stresses for each statutory fund.
- However, the insurance business needs to be set up in a separate statutory fund compared with the investment-linked business as per the Life Act requirement.
- Hence, the only aggregation benefit that does exist will be between whatever asset risk charge exists for the insurance business (which may be small) and the insurance risk charge. There is not likely to be an insurance risk charge for the investment-linked business as the fees can withstand a 10% increase in expenses.

Marking Guide

- **1 mark for confirming prudential standards do allow for diversification benefit**
- **1 mark for separate statutory funds required**
- **Up to 1 mark for any other well expressed relevant point (e.g. diversification benefit only available within a statutory fund)**

(c)

Refer to spreadsheet for solutions.

(i)

	Valuation Date
RFBEL	(3,210,585)
TV	41,667
PL	(1,577,088)
APL	41,667
Regulatory Adjustment to Net Assets	**(1,618,755)**

1 mark for correct answer

(ii)

Impact of Random Stress	82,005
Impact of Future Stress	421,413
Impact of Event Stress	679,610

3 marks for Random stress impact working (including 1 mark for IBNR)
3 marks for Future stress impact working (including 1 mark for IBNR)
2 marks for Event stress impact working
Deduct 1 mark for each mistake (deduct only 0.5 marks if the impact is not explicitly shown)
Subject to a minimum of 0

(iii)

Diversification Factor	**67.9%**

2 marks for correct calculation of diversification factor (based on answer to part (ii), i.e. previous mistakes are allowed to be carried forward without penalty)
Deduct 1 mark for each mistake
Subject to a minimum of 0

(iv)

	Valuation Date
APL	41,667
At Valuation Date + 1 Year	
Stressed RFBEL	(1,959,473)
Stressed TV	50,022
Stressed APL	50,022
Discounted to Valuation Date	
Stressed APL (12 months)	48,802
PV Stressed Yr1 Cash Inflow (Outflow)	(130,599)
IRC (gross tax)	137,735
IRC (net of tax)	**96,414**

2 marks for applying lapse stress (deduct 1 mark if not for correct term, i.e. 36 months).
2 marks for applying expense stress (deduct 1 mark if not for correct term, i.e. 36 months).
1 mark for applying stress to IBNR (deduct 0.5 marks if not for correct term).
2 marks for applying random, future, event stresses diversified all together (deduct 0.5 marks for each distinct minor error, floored at 0).
1 mark for correct PV stressed 1 year cash flows (deduct 0.5 marks for each distinct minor error, floored at 0).
1 marks for stressed APL at 12 months, discounted (0.5 marks if not discounted)
0.5 marks for gross of tax IRC
0.5 marks for net of tax IRC

Up to 10 marks

(d)

Memorandum
To: CFO of PQR Insurance
CC: CFOO of ABC Life
From: Appointed Actuary, ABC Life
Subject: Disadvantage of increasing ABC Life Quota Share Reinsurance with AussieRe

Dear CFO,

Increasing the level of quota share reinsurance ABC Life holds with AussieRe does have a potential disadvantage from a capital viewpoint.

This is due to this potentially causing ABC Life to hold a sufficiently large concentrated exposure to a single counterparty (AussieRe). Under Australian capital requirements, there may be an increase in capital (through a concentration risk charge) required as a result, to protect policyholders against the risk of AussieRe defaulting on the reinsurance in adverse circumstances.

This risk however can be mitigated, for example by:

- Maintaining a 20% share with AussieRe and taking out additional quota share reinsurance with another reinsurer (thereby not increasing the counterparty concentration to AussieRe).
- Agreeing to special terms with AussieRe which reduce ABC Life's exposure to AussieRe under Australian capital standards (e.g. by paying reinsurance premiums twelve months in arrears, which offsets ABC Life's exposure to AussieRe).

Regards
Appointed Actuary, ABC Life

Marking Guide

- **1.5 marks for identifying a suitably outlined potential risk/disadvantage with appropriate clarity**
- **1.5 marks for appropriately outlining of how this risk/disadvantage can be mitigated**
- **1 mark for appropriate format and language**

  Up to a maximum of 4 marks

END OF MARKING GUIDE QUESTION 2

QUESTION 3 MARKING GUIDE

(a)

To: Graduate

Subject: 31 December 2016 Participating Business Valuation

(i)

In relation to the 31 December 2016 valuation results, it is expected that:

VSA

- Given that the actual investment experience is captured within the VSA, the VSA will have decreased since the September position. As a large proportion of the assets backing the participating business are invested in long term fixed interest securities, the recent upward movements in the yield curve will have reduced their value materially. This reduction would outweigh any actual investment earnings.

BEL

- The discount rate to value the best estimate liability will have increased due to the upward movements in the yield curve, resulting in a lower BEL.
- However, as the asset duration is longer than the liability duration, proportionally, the VSA will reduce more than BEL. As such, BEL as a proportion of the VSA will increase. Given the level of BEL was already 95% of VSA, there might be a chance that this business will be in loss recognition.

BE Supportable Bonus Rate

- All things being equal, there will be downwards pressure on the supportable bonus rate, as the VSA have reduced by more than the BEL (reducing the PV BE Bonus component of the policy liability).

Marking Guide

- **Up to 1.5 marks for VSA (up to 0.5 marks only if do not state VSA decreases)**
- **Up to 2 marks for BEL:**
    - **1 mark for describing the yield change results in a lower BEL**
    - **1 mark for describing BEL reduction will be less than the VSA**
- **Up to 1.5 marks for describing downward pressure on the BE supportable bonus rate**

Up to 5 marks

(ii)

As a results of the mismatch in assets and liabilities, the bonus that can be supported has deteriorated (the resulting declared bonus might be a lot lower than historical levels and may not meet policy owners' reasonable expectations).

Therefore, MEDLIFE must address the mismatch after the annual valuation by:

- Conducting a full review and proposing a new investment strategy that is suitable for the current market condition, the existing liability profile and help to deliver the policy owners' reasonable expectations of future bonuses.

- The review should ensure that assets and liabilities are regularly monitored so that any developing mismatch is addressed in a timely manner (i.e. rebalance the duration of the underlying fixed income assets to better match the liabilities).
- This is likely to be implemented through selling longer term fixed interest assets and purchasing shorter duration fixed interest assets to match the liabilities.

Marking Guide

- **1 mark for level of declared bonus rate reduces (0.5 marks) and mentions policy owners' reasonable expectations (0.5 marks)**
- **1 mark for stating a rebalance of assets is required to better match the duration of liabilities**
- **1 mark for conducting a review**
- **1 mark for any other relevant considerations**

Up to 2 marks

(b)

(i)

- The recent reduction in the surrender experience has persisted for the last couple of years which provides strong justification in reducing the surrender assumption Therefore the surrender assumption should be revised down.
- However, it should be noted that:
    - The past bonus declaration have been generous post the global finance crisis when compared to other available investment options. This could have contributed to the much lower surrender experience than expected.
    - In light of recent yield movements, the supportable bonus is expected to be lower and the actual bonus rate is likely to experience downward pressure, which may increase surrenders in the near future.
- Lower surrender experience also could be due to the conservative surrender basis particularly as a growing proportion of the policies approach their maturity date.
- Therefore, reducing the assumption down to 3.5% is unlikely to be appropriate as a long term assumption.
    - A lower surrender assumption will reduce the level of future supportable bonus rate, and lower future supportable bonus rate, which may ultimately result in higher surrender experience.
    - Hence, a better middle ground might be somewhere between 8% and 3.5%, with ongoing monitoring of experience recommended.

Marking Guide

- **1 marks per appropriate, well-described point relevant to the situation given**
- **0.5 marks per generic point (i.e. doesn't relate specifically to the situation given), up to 1 mark**

Up to 3 marks

(ii)

- Given the surrender assumption has been maintained at 8% where there was evidence of a downward trend, you would expect to see surrender experience losses in the last couple of years.
- Lower surrender experience than expected results in a surrender experience loss for this business. This is because a conservative surrender basis implies the surrender value paid to policy owners will be less that the actual reduction in the policy liability. In other words, every surrender generates a surrender profit.
- To a small extent, lower surrender experience will potentially result in a potential expense profit as the cost of paying surrenders reduces.

Marking Guide

- **1 mark for identifying a surrender loss is expected**
- **1 mark for describing why less surrenders than expected results in a surrender loss**

Up to 2 marks

(c)

(i)

- Claim decrement experience is mainly:
  - Mortality experience item – more deaths than expected will result in experience losses. This is due to the claim payment of the Sum Assured plus reversionary bonuses exceeding the reserve held.
- Non-claim decrement is mainly:
  - Surrender experience (per part b) (ii)). The policy liability is released upon surrender and a surrender value paid, which drives this experience item.
  - Paid-Up experience item – this arises when the policyholder decides to cease paying premiums at some point before the end of the contract term. As the company also adopts a conservative basis for Paid-Up policies, every Paid-Up should also generate a Paid-Up experience profit. This is similar to the surrender experience item discussed above.
- Expense experience:
  - Expense experience profit/loss may result from lower/higher actual expense as a result of genuine changes in the level of management expenses (i.e. staff costs, rent or IT costs) with respect to the product.
  - Alternatively, this could result from lower or higher than expected inforce count which might have affected the actual expense apportionment between participating and YRT risk products.
- Investment experience:
  - There will be no investment experience profit or loss for participating business as the variances will be all absorbed into VSA.

  - Differences between actual and expected investment returns affects the current year best estimate cost of bonus and the value of future best estimate bonuses, which are both included in the policy liability.

Marking Guide

- **0.5 marks for stating surrender experience is in non-claim decrement experience.**
- **1.5 marks for non-claim decrement experience item:**
  - **0.5 marks for any other relevant point around surrender experience/other relevant point**
  - **1 mark for describing paid up experience**
- **1 mark per other experience item in (i), with:**
  - **0.5 marks awarded for <u>Investment experience</u> item if linked to the impact on the VSA, with 1 mark awarded if it is recognised that the investment return is reflected in the policy liability)**

Up to 5 marks

(ii)

- Claim decrement experience:
  - This is consistent with YRT risk products in direction i.e. higher than expected deaths will lead to an experience loss.
  - However, the proportional impact per death will be much more significant for YRT risk products than traditional participating products. This is due to the sums at risk – YRT policies have significantly higher sums insured which are fully at risk (ignoring reinsurance) whereas the sum at risk reduces for participating policies as the reserve grows.

- Non-claim decrement experience:
  - The equivalent to surrender experience for YRT risk products is the lapse experience.
  - However the impact is different – higher than expected lapses leads to an experience loss for YRT. This loss arises from the unrecovered acquisition expenses (DAC) needing to be capitalised for the additional lapsed policies.
  - The loss can be sizeable for YRT products if the additional lapses occur in the early durations of the policy. For participating policies the experience profit reduces as the policy approaches maturity – i.e. the surrender value should approach the maturity value (even with a conservative basis).
  - There is no equivalent paid up experience for YRT policies.

- Expense experience:
  - The expense experience is determined similarly for participating products and YRT risk products. In both cases higher than expected expenses will lead to an experience loss.

- Investment experience:
  - Unlike participating business, an investment experience will be reported in the Analysis of Profit for the YRT risk products.
  - This will reflect:

- Any changes to the policy liability due to changes in discount rates over the valuation period.

- The difference between the discount rate and the actual rate of investment return on the policy liability and cashflows over the reporting period.

Marking Guide

- **2 marks for valid points under Claim Decrement experience (must discuss death strain to get 2 marks)**
- **2 marks for valid points under Non Claim Decrement experience (must mention DAC to get 2 marks)**
- **1 mark for Expense experience**
- **1.5 marks for investment experience**

Up to 6 marks

(d)

- Any expense experience loss of the MEDLIFE participating business is split 80% to policyholders and 20% to shareholders. This can therefore significantly impact the **future** bonus rates declared to policyholders on the product.

- It is important that the Appointed Actuary is fully aware of the reasons for the experience items prior to setting bonus rates.

- It is important to understand whether the large expense loss is a new occurrence as this will help provide guidance as to what items to investigate. If it has existed previously it is important to understand what actions were taken and why given the potential impact on bonus rates.

- A large Expense experience loss could indicate either:

  - a genuine direct expense overrun; or

  - an overhead mis-allocation; or

  - a one-off expense (e.g. a project).

- As the old participating business is in run off, the expense allocation should be decreasing over time – if this is not the case then the allocation should be investigated further to understand why this is not the case.

- There might still be a possibility that the expense reduction is not fast enough to be reasonable for a participating book.

  - This may be due to the difficulty in reducing fixed expenses relating to the participating products (i.e. legacy system costs).

  - Or this may happen as a result of apportionment methodology deficiency or difficulty in identifying the true expense cost for the participating book.

- The Appointed Actuary can exercise their judgement and bypass the allocation and propose a capping to the total expense allocated to Participating business with appropriate justification (e.g. when the policy holders have been unfairly or adversely impacted by expense allocation). Such a capping may be in the form of setting an expense per unit assumption that is indexed each year, with the expense overrun allocated to the shareholder.

Marking Guide

- **1 mark for any relevant point which demonstrates understanding, up to 4 marks**
- **2 marks for stating the AA can exercise judgement in the expense allocation if the allocation process treats policyholders unfairly.**

  Up to 5 marks

END OF MARKING GUIDE QUESTION 3