**2018 S2**

**Q1** a) i. & ii. see spreadsheet

1b) To CEO:

This memo sets out my responses to the questions you have raised following the recent Board meeting

i. For loss ratio, I would compare the assumptions with the actual experience of the business under FinServ’s administration.

For sales volume, compare with other competitors in the market to see whether it is reasonable.

For capital stress margin,

**Assumptions**

In order for me to get comfortable with the assumptions used, I would perform the following work:

* Sales
  + Compare the projected sales with recent historical experience in the segments of the market FinServ wish to enter;
  + Review reports from research houses which illustrate the growth prospects for FinServ’s target market and compare them to FinServ’s projected numbers; and
  + Hold discussions with the management of FinServ about their plans supplemented by discussions with internal colleagues
* Loss Ratios
  + Compare the loss ratios assumed with observed experience which can be obtained from the APRA statistics
  + Compare the loss ratios assumed against loss ratios from our other clients
  + Understand differences in FinServ’s product range compared to the industry
  + Hold discussions with FinServ’s management to understand their underwriting, product design and claims management supplemented by discussions with internal colleagues
* Stress Margins
  + Compare the stress margins assumed with the results from the **latest stress margins survey which shows results from across the industry**;
  + Hold discussions with FinServ management to understand their Experience Investigation, reporting and risk management processes along with their IT capability
  + Perform a bottom up determination of the stress margins based on this information and the Actuaries Institute Information Note

ii. Adv: easy and straightforward to calibrate and easy to explain to the board.

Disadv: it ignores other concerns, such as whether the company has the ability to remain such a target as the business is expected to grow dramatically in the next 10 years.

It does not have a specific rational behind this target surplus. For example, the company may wish to remain a certain level of rating by having this amount of target surplus.

**Target Surplus**

* Advantages
  + It is easy to understand as it is directly proportional to the regulatory capital calculation
  + It is easy to compute
* Disadvantages
  + It is difficult to form a link between the target surplus held and **the risk appetite** of FinServ
  + It relies heavily on the regulatory capital calculation and therefore **does not consider the full range of risks FinServ is exposed to**.
* Alternative
  + **It is common practice to set a target surplus amount that is based on the risk appetite of the company. This may be expressed as a probability of not breaching the PCA over a one year timeframe after a stressed event**. For example, FinServ will hold target surplus such that, after a 1-in-50 year event, FinServ can meet its PCA at the end of the year. The stressed event may consider the full range of risks that FinServ is exposed to.

iii. The Zero policy liability does not look reasonable while the company actually runs a large volume of business.

It does not reflect the impact from liability change on the capital.

**Suitability of Model for Policy Liability Valuation**

The projection model is intended to provide a high-level view of the projected financials of FinServ. It should not be used for determining the policy liabilities as:

* It does not have the capability to determine **claim reserves** for claims that have been incurred. The model makes a simplifying assumption that all claims are fully settled in the year that they are incurred. Based on historical experience, this assumption is unlikely to eventuate in practice;
* Even if the assumption did eventuate, there would be timing issues in that claims could be incurred in the month prior to the valuation and still not settled. Reserves would need to be held for these claims
* The model is a high-level model and is not at the granularity required to measure liabilities. Liabilities are typically measured at a benefit (death, TPD and IP level). By extension, a LAT would not be able to be performed as the model does not project separately for each RPG.

iv. ~~The current model only considers the projection for the next 10 years while has no allowance for the longer period.~~

~~This does not reflect the business in an on-going concern. It seems that the board of FinServ to sell the company once it goes public.~~

**Shortcomings of approach**

[Reinsurance asset not identified under current approach] The current approach to modelling the claims cost is to assume that all claims are settled in the year they are incurred. In practice, there is a delay between the claim event and the notification date (and ultimately payment date). These delays mean that part of the claims cost represents reserves for future notifications and payments. As the business will be 60% reinsured, these reserves have a reinsurance component which is held as an asset on the Balance Sheet.

The capital standards have limits on the amount of exposure an entity is allowed count for capital purposes – this includes exposures to reinsurers. If a full projection was performed, FinServ may breach these limits which may mean that future capital injections are required.

Lapse is not taken into consideration.

Please let me know if you have any questions.

Regards, Consulting Actuary

1c) *Dear ET,*

*This memo sets out my responses to your recent requests concerning valuing the business using Embedded Value techniques.*

**i. Performing the Valuation at T = end of year 10**

Based on the projection model produced, the valuation of the business could be derived as follows:

* The adjusted net worth can be calculated using the existing projection model, which provides a view of the **available assets available as at time 10**, once future capital requirements are allowed for.
* For the business in force at the end of year 10:
  + **Project forward the expected profits on this business** using assumptions on future claims, expenses, and the probability of renewal and future capital requirements of the business. These assumptions may be different to the current ones in the Business Plan
  + Discount these Cashflows back to the valuation date (after 10 years)
* **[RDR]** The valuation would require assumptions on future claims, expenses and the probability of renewal. In addition, given the uncertainty in the timing and the amount of the Cashflows, they are typically discounted using a risk discount rate (risk-free rate plus a margin to compensate the shareholder for taking on the risk). The selection of the discount rate is subject to judgement
* **[Franking Credits]** In addition, dividends to Australian shareholders are typically franked meaning that tax has already been paid on the profits. Hence, the value to shareholders should also include a value in respect of this tax. An assumed proportion of the tax to include should also form part of the value. However, consideration should be given to whether the shareholder is an Australian based one or overseas (which may not be able to get the benefit of the franking credits). In this case, the company may be two-thirds owned by overseas shareholders
* For new business after year 10:
  + It is common practice to perform a similar calculation to the one above on one year’s worth of sales and apply a multiple to this value. This is subject to judgement.
* The sum of these two components will give you the Appraisal Value of the company.

**ii. Other Valuation Measures**

* Another approach is to apply a multiple to a year’s earnings to arrive at a value. However, this is subjective and is not common practice in the market.
* P/E ratio approach

**iii. Rationale for using Embedded Value**

The use of Embedded Value techniques is the preferred approach as:

* EV is a more common approach. In particular, practice is evolved in areas where subjectivity is involved
* As it is a more common approach, it is easier to compare the result with other similar companies

**Q2** a) Policy Liability = BEL Lump sum + PVPMs Lump sum + BEL DII= -1 + 0.5 + (-0.2) + 0.5 = -0.2

2b) ~~PL’ = Reinsured Comm = 0.8 as it is 100% quota share reinsurance treaty.~~

*Reinsured Comm? Positive in BEL calculation, similar to premium*

Policy Liability = BEL Lump Sum net of RI + PVPMs Lump Sum net of RI + BEL DII

*= (-1bn +1bn) + (0.5bn + 0.8bn-1bn) + (-0.2bn+0.5bn) = 0.6bn*

[calculate the reinsured profit margin as **the difference between the reinsured BEL and the commission received**]: The previous PV profit margins for the lump sum book of 0.5bn is effectively replaced with a new PV profit margins of 0.3bn, given that 0.2bn of PVPMs has effectively been transferred to the reinsurer in exchange for the up-front cash commission.

2c) i. it will increase 2019 profits by 0.8m immediately given there is no future liability for the LS business under a 100% quota share reinsurance arrangement and hence there is also no need to defer the commission income.

**[No profit at inception]** The commission itself does not result in $800m of profit at the time of the transaction because there is an offsetting increase to policy liabilities.

The present value of profit margins is expected to fall by $200m which means that the profit in all years starting from 2019 is expected to reduce.

ii. IRC will be reduced to 0 given no more future insurance liability.

The aggregation benefit may decrease as a result and the asset concentration risk may increase since all the LS business is transferred to one reinsurer.

It is still likely that he capital base will increase more than the offset of increase in ACRC and drop in aggregation benefit.

* **The capital base is expected to increase** due to the $800m of commission from the reinsurer. The commission is received as cash which forms part of the capital base, whereas the termination value is unchanged following the transaction.
* [DTA offsetting impact] Depending on the tax situation, including the presence of Deferred Tax Assets/Deferred Tax Liabilities, the increase in capital base may be less than $800m.
* **There will be no increase for the IRC** In relation to the claims reserves, **as the reinsurance contract only covers claims incurred on or after 1 January 2019**.
* **There may be no change to the IRC as the IRC before and after reinsurance may be zero (if the product is sufficiently profitable).** Otherwise, the IRC would be expected to decrease, if the IRC prior to insurance was greater than zero.

2d) To Board,

Regarding the reinsurance options offered by OZRE, I would like to share my opinion.

RI Offer I

Adv:

The LS business will entirely be taken over by the reinsurer, leading to a zero volatility of future earnings.

Much capital can be released to the shareholders under this agreement.

* Dividend: Offer 1 should enable a large dividend to be paid to AUSLIFE’s shareholders
* Capital usage: Offer 1 may reduce the capital requirements of AUSLIFE freeing up capital for other uses.

Disadv:

It also gives the potential earnings from running the LS business to the reinsurer especially when LS’s experience has been stable in the recent years.

Huge asset concentration risk by accepting this offer.

* Risk of future reinsurance premium increase: Offer 1 gives the reinsurer the opportunity to increase the reinsurance premium rates in the case of worsening claims experience, and furthermore there is not a clear mechanism for the size of any increase. This feature of the treaty will pose an ongoing risk to profitability and potential difficult discussions with the reinsurer.
* Not dealing with disability income issues: Offer 1 is essentially cashing in on the successful and stable lump sum business of AUSLIFE however does not deal with the main underlying risk to profit stability which is the DII book. Furthermore, AUSLIFE will have reduced profits from the lump sum book to help offset any further loss recognition on DII.
* Offer 1 is expected to require APRA approval under LPS 230 due to the commission payment, which is likely to add to the implementation time

RI Offer II:

Adv:

Given DI is expected to suffer losses, the offer 2 can reduce the future liability payments and also reduce the loss that may occur.

The volatility of future earning is reduced.

Reinsurer may have more expertise who can help the company manage the DI business.

**Capital usage**: Offer 2 will reduce capital requirements of AUSLIFE by reducing the disabled lives reserve.

Disadv:

No upfront commission is paid, and there is cap of monthly reinsurer payment. These will leave the company be exposed to the extreme events where the monthly DI benefit is higher than 50k. Hence the earning can still be very unstable in extreme cases.

Assets need to be transferred to reinsurer. Capital benefit may not be significant under this option.

Asset transfer: depending on the make-up of the assets transferred, this **may cause an asset-liability mismatch and increase the volatility of profit**.

2e) Scope:

Whether the in-force disability income includes those disabled lives or only includes active lives only.

This will determine the policy liability of DI business.

Whether the interest on the transferred asset will be paid back to the company during the settlement.

It is important to consider the interest income on capital, which may be a major part of the profit given DI experience is poor.

Whether the amount of asset being transferred to reinsurer will be adjusted.

This affects the capability of the company meeting the solvency requirement.

*The following terms not mentioned in the table would also be very important to define in the treaty:*

* **Collateral:** Under Offer 2 AUSLIFE will have a large counterparty exposure to OZRE in respect of the reinsured disability income claims. As such it will be very important for AUSLIFE to ensure that it receives appropriate collateral from OZRE to ensure that it is not overly exposed to a default of OZRE and furthermore that there is not a large capital requirement in respect of concentration risk.
* **Termination rights**: It is important for AUSLIFE to ensure that there are no termination provisions which might allow OZRE to release itself from its obligation to pay 80% of all disability income payments of the reinsured business in the future.
* **Payment Schedules**
* Recapture

2f) i. Adv: the transfer will save the company’s capital without increasing the capital requirement by introducing the ACRC.

• Transfer means full legal and economic responsibilities would move to the transferee and a clean separation from the business.

• It also means **no need for future work to administer the reinsurance** or discussions with OZRE about treaty interpretations etc.

• It may increase the number of potential buyers beyond those willing to enter a reinsurance arrangement, and potentially help achieve a higher price

Disadv:

It might affect the new business as many policyholders may wish to purchase all of their covers in one company. The company will lose these clients as a result.

• The sale price net of all transition costs may be lower than embedded value of the liabilities, reducing shareholder value.

• Loss of scale in distribution channels, with less premiums to spread fixed costs over

• **Ceding** market share and the potential strategic benefit of the business line

ii. The transfer requires a court process under Part 9 of the Life Insurance Act. Under the process there will be **various parties (e.g. Appointed Actuaries, independent actuaries, regulator, and ultimately the judge**) which need to be comfortable that **no policyholder from either company is materially worse off** as a result of the transaction. The entire process would be expected to **take around 6 to 12 months to complete** from the time of signing.

iii. The transaction should be no harmful to the policyholders. The buyer should be able to meet any liabilities when they fall due.

All the policyholders should be informed and make sure all their concerns have been addressed before the transaction.

In the case of a transfer of the lump sum business, the challenge for the Part 9 process is likely to be **to demonstrate that the disability income policyholders of AUSLIFE are not worse off following the transfer**. This is because currently the performance of the lump sum business provides support (effectively a cross-subsidy) to ensure the obligations to the disability income policyholders are met.

2g) RI OFFER 1 will reduce the VIF and therefore reduces the capital base after the proposed changes.

It becomes less attractive to enter into such an agreement as the capital base will increase and surplus capital can be distributed to the shareholder without the reinsurance.

If the embedded value calculated at a risk free rate was treated as the capital base then AUSLIFE’s excess assets above minimum capital requirements would be expected to increase even if it didn’t enter into reinsurance offer 1, and it may be able to pay a dividend with other liquid assets elsewhere in the business. This is because there would no longer be a termination value floor and significant future cash inflows would be eligible. Entering into the reinsurance arrangement may not actually improve the capital position, but rather just monetize part of it. All else equal, such a change in capital rules would tend to reduce the attractiveness of offer 1.

**Q3** a) i.

AOP may be conducted based on the last quarter end assumptions while Experience Investigation may be based on the assumptions as of the beginning of the year.

EI may include the projection of IBNR while AOP only focus the current period benefit payment.

The timing difference: some claims delays until EI has been finished.

It would be expected to have less impact on mortality RPG as there is a much shorter period between the occurrence date and reported date for death.

*Three possible reasons for the misalignment are:*

• There may be a difference in the timing of recognition of claims between the AoP and EI analysis. For example, the AoP results provided may be on notified claims basis, while EI on incurred claims basis. Claims relating to a past incurred period may have been settled in the current period for an amount greater than their IBNR/RBNA reserves.

**• There may be a difference in the allowance for policy liability components**. For example, the AoP results provided includes both IBNR and RBNA but EI may not include both (or allowed for in a simplified manner).

• **The AoP is on a net-of-reinsurance basis and the EI is on a gross-of-reinsurance basis**. This can contribute to the contradictory results if, for example, the number of claims above the retention level was smaller than expected, there were claims with large sum insured (with sum reinsured capped at a maximum), or claims declined by the reinsurer.

The above reasons would be expected to have **less** impact on Lump Sum Mortality, relative to Lump Sum Morbidity, because:

* Timing of recognition of claims:
  + Shorter reporting delays associated with mortality claims (noting that the Lump Sum Mortality consists mainly of standalone Death policies) mean less difference between notified and incurred claims basis, and also means that the IBNR is expected to be smaller for Lump Sum Mortality.
  + The smaller Lump Sum Morbidity RPG size (compared to the Lump Sum Mortality RPG), means that the AoP results are more easily swayed by a few claims (with relatively long reporting delays).
* Allowance for policy liability:
  + **Claims processing times are likely shorter for mortality claims** compared to morbidity claims (due to the greater complexity associated with assessing morbidity claims). This means RBNA for Lump Sum Mortality is expected to be smaller.
* Reinsurance:
  + The larger size of the Lump Sum Mortality RPG will mean that the variability of actual to expected reinsurance claims amount will be considerably lower, reducing the impact on the AoP result.

ii. Timing issue: the CICP had only increase 10m when the AOP was conducted. But it grew to 15m afterwards.

*Two possible reasons relating to the presentation of AoP results are:*

• The impact of **discount rate changes** over the year on the CICP reserve may not be included as part of the “claims experience profit” item but separately as part of the “discount rate changes” item.

• **The difference in the actual and expected claim expenses associated with the CICP reserve** may not be included as part of the “claims experience profit” but separately as part of the “expense” item.

3b) i. Dear CFO,

*In preparation for financial year-end 31/12/2018 reporting, please find below the changes to the valuation assumptions I am proposing for the policy liability valuation as at 31/12/2018 in respect of the Income Protection Related Product Group (“RPG”).*

I am proposing to:

* increase (strengthen) the claims incidence assumption by 17%
* increase (weaken) the claims terminations assumption by 10% for policies with 2-year benefit period, while keeping the claims terminations assumption unchanged for policies with “to age 65” benefit periods.

This proposal reflects the following considerations:

* **For incidence:**
  + The Experience Investigation indicates an apparent worsening trend in the incidence experience, with the Actual-to-Expected ratios increasing from 90% to 120% over the period from Jan 2015 to Sep 2018.
  + Over the same period, the aggregate Actual-to-Expected ratio is 117%, indicating worse than expected incidence experience over the past 3.75 years.
  + This trend is further supported by the YTD Analysis of Profit results showing an incidence experience loss of $15m, net of reinsurance (i.e. Item 3e in Table 3).
* These results support an increase (strengthening) in the claims incidence assumption by 17%.
* **For terminations:**
  + The Experience Investigation indicates an apparent improving trend in the terminations experience for policies with 2-year benefit periods (with the Actual-to-Expected ratios increasing from 96% to 111% over the period from Jan 2015 to Sep 2018), but indicates no clear trend for policies with “to age 65” benefit periods other than a potential one-off better than expected experience over YTD 2018.
  + Over the same period, the aggregate Actual-to-Expected ratio is 110% and 101% respectively for 2-year benefit periods and for “to age 65” benefit periods, indicating better than expected terminations experience over the past 3.75 years for the former subgroup but close to expected experience for the latter subgroup.
  + The improving trend for 2-year benefit periods and the potential one-off improvement for “to age 65” benefit periods over YTD 2018 is consistent with by the YTD Analysis of Profit results, which shows a terminations experience profit of $25m, net of reinsurance (i.e. Item 3f in Table 3).
* These results support an increase (weakening) in the claims terminations assumption by 10% for policies with 2-year benefit period, while keeping the claims terminations assumption unchanged for policies with “to age 65” benefit periods”.

ii. *Additional investigations prompted by the experience loss on RBNA (Item 3c in Table 1) include:*

* Investigate whether there have been any longer delays in making claim decisions, and whether this is expected to continue further into the future.

*Additional investigations prompted by the experience loss on CICP relating to “other assumptions” (Item 3g in Table 1) include:*

* Investigate the appropriateness of the “payment ratio” assumption (i.e. the ratio of monthly claim payment to the monthly insured benefit).
* Investigate whether there have been any changes to claims management practices such that less claims are being declined, and whether this is expected to continue further into the future. This would assist in assessing the appropriateness of the “decline rate” assumption (i.e. proportion of pending claims which are declined).
* Investigate the level of re-opened claims against expected, to assess the appropriateness of the “re-opened claim rate” assumption (i.e. proportion of closed claims which are being re-opened.

*Additional investigations prompted by the information available in Tables 1 & 2 for claims incidence and terminations experience include:*

* Perform experience investigations for claims incidence and terminations, split by further rating factors, such as sickness/accident, waiting periods, gender, age, claim cause (e.g. mental health, cancer) agreed value/indemnity etc.
* Obtain the analysis of profit results from past years (and if possible, based on current valuation assumptions), to provide a better view of the trends.

3c) Previous Profit Margin % = PV Profit Margins / PV Claims = 112.5 / 750 = 15%

PL = Prev BEL + Prev PV of profit margin = 300 + 750 – 1500 + 112.5 = -337.5

New BEL = 300 + 750\*(1-10%) – 1500 = -525

New PV of profit margin = PL – new BEL = -337.5 – (-525) = 187.5

**New Profit margin %** = PV Profit Margins / PV Claims = 187.5/ [750\*(1-10%)] = 27.78%

**No impact on 2018 reported profit** (as the RPG did not go into loss recognition).

Previous 2019 planned profit = 50 \* 15% = 7.5

**New 2019 planned profit** = 50\*(1-10%)\*27.78%= 12.5

3d) i. *Suggestion to reverse loss recognition position in the future:*

In regards to the suggestion to reverse the loss recognition position in the future via a favourable assumptions changes, please find below the considerations:

* Each year, the accumulated losses are recorded and carried forward to the following year and **would need to be reversed in full to restore profit margins**.
* The accumulated losses can be:
  + increased by unfavourable non-economic assumption changes and unprofitable new business;
  + reduced by favourable non-economic assumption changes and profitable new business; and
  + run off in accordance with the run-off of the business.
* **[Outlining the components of the accumulated losses]** As such, the accumulated loss just before the suggested terminations assumptions change would be:
  + $50m capitalised from three years ago; *plus*
  + $20m capitalised this year due to the proposed assumption change; *less*
  + favourable profitable new business from three years ago to the point of terminations assumptions change; *less*
  + the amount of the capitalised losses that have been run off, if AOPLIFE had chosen to do so.
* For the loss recognition position to be completely reversed, the accumulated losses at that point of terminations assumption change would need to be fully offset, i.e. it is not just the $20m capitalised this year that needs to be taken into account.

So to answer management’s query: unless the profitable new business sold over the period **plus the run-off amount** is able to offset $50m or more of the accumulated loss, the loss recognition would not be reversed out via the weakening of terminations assumptions.

ii. *Premium increase required:*

~~Current BEL = 4000 + 1500 – 5000 = 500~~

~~Target BEL = -20~~

~~PV of Premium should increase = 500-(-20) = 520~~

~~520 / 5000 = 10.4%~~

As simple as 20 / 5000 = 0.40% !!!

A 0.40% overall premium increase would be required to fully reverse a $20m loss recognition position, assuming no impact of the premium increase on policyholder behaviour in relation to lapses. (This is calculated as $20m loss recognition position / $5bn present value of premiums.)

iii. *Impact of changes in policyholder behaviour in relation to lapses on the level of premium increase required:*

In the case of a premium increase:

* There is a risk that policyholder lapses are too high resulting in high lapse losses. However it is noted that this depends on whether the capitalised losses fully wiped out the deferred acquisition costs or whether lapses are occurring on policies where acquisition costs have been fully recouped (in which case policyholder lapses may in some cases result in lapse profits).
* There is also the risk of adverse selection by policyholders such that “healthy risks” lapses leaving a higher proportion of policyholders with “bad claims risk”, resulting in overall worse claims experience. This can further worsen the losses on the Income Protection RPG.

Therefore, there needs to be a balance to **ensure that the benefit from the premium increase (increased profitability of the RPG) does not outweigh the additional costs** (potential lapse and claim losses).