**2009 S2**

**Q1** a) The principles for determining the policy liability of investment linked business are:

* The policy liability comprises the Life Investment Contract Liability (LICL) and the Management Services Element (MSE).
* The LICL is determined under AASB139.
* The LICL is determined at fair value.
* The LICL cannot be less than surrender value.
* The MSE is determined under AASB118.
* The MSE is the value of deferred entry fee revenue less deferred acquisition costs..
* Incremental acquisition costs may be deferred if they are separately identifiable and if it is likely they will be recovered.

1d) i. Profit reporting will change as follows:

* Profit emergence will be unchanged as both trust managers and life investment contracts are governed by AASB139 and AASB118.
* The format of the P&L will change to “fees less expenses”.

ii. Factors to consider in determining capital for the trust manager:

* The regulatory capital requirements will be significantly different. The Life Insurance Act solvency and capital adequacy requirements will no longer apply.
* The trust management company will still need to have sufficient capital in order to manage the risks it is incurring. $5 million may not be adequate.
* The directors will need to consider what probability of ruin is acceptable.
* The directors will need to consider the time horizon between the occurrence of adverse experience and management implementing actions to address the problem.
* They will need to consider the risks to the business. The most significant risks to the management company are:
  + Redemption risks in the superannuation trust which the management company may be obliged to fund – e.g. asset prices below unit prices, allowance for selling costs is insufficient, allowance for deferred tax is insufficient
  + Expenses of the management company exceed fee revenue. E.g. due to new business strain or a sudden loss of existing business.
  + Intangible assets not being realisable – e.g. loans to agents, computer software, future income tax benefits.
  + Mismatching of the assets held to cover other liabilities of the management company.
  + Operational risks.
* They will need to consider the diversification of these risks within BST.
* The cost of capital should be considered. The cost of capital (above regulatory requirements) is difficult to determine. As the amount of capital increases, the probability of ruin will decrease. On the other hand, more capital also increases the “agency” risks – management not using capital in the best interests of shareholders.
* They may need to consider the requirements of ratings agencies (if BST intends to issue debt).
* Other potential stakeholders in the superannuation funds (e.g. trustees, members, employers) may have a requirement for minimum financial strength of the trust management company.
* Sources and availability of capital need to be considered. The primary source is likely to be BGG. How mobile is capital within the group?
* Consider the diversification of risks within the BGG group.

**Q2** b) **Interest rates**

* Lower interest rates will increase the VSA and hence the policy liability for both IA and Conv.
* The policy liability will increase further if the BEL, calculated using the risk free discount rate, exceeds the VSA (the Adequacy Threshold test).
* The PRP will increase due to the increase in value of the fixed interest assets backing it.
* The capital adequacy liability increases by a large amount, probably because the value of guaranteed benefits increases to such an extent that future bonuses fall to zero under the capital adequacy liability assumptions.
* Current termination values for conventional may increase due to a change in the terminal bonus rate. This is in response to the increase in asset values resulting from the fall in interest rates.
* Current termination values may also increase if the interest rate used to find the surrender value of sum insured and reversionary bonuses is actively managed.

**Lapse rates**

* Higher lapse rates have no effect on the policy liability as **changes to future bonus rates** are absorbing their impact.
* There is no impact on the current PRP as only future profits are affected.
* Higher lapses increase future profits for conventional as the policy liability exceeds the CTV. (from the table in the question)
* Higher lapses reduce future profits for investment account as the policy liability is less than the CTV. (from the table in the question)
* The overall effect of higher lapses for the fund is likely to be higher profits in future. The Capital Adequacy Liability is likely to be equal to the policy liabilities plus PRP less the value of future shareholder profits after allowing for the effect of the adverse conditions assumed. As higher lapses increase the value of future shareholder profits then the Capital Adequacy Liability will reduce as shown.
* Future lapse rates have no effect on the CTV.

**Mortality rates**

* Higher mortality rates have no effect on the policy liability as **changes to future bonus** rates are absorbing their impact.
* There is no impact on the current PRP as only future profits are affected.
* [Par] Higher mortality rates will reduce future profits. This explains the increase in the Capital Adequacy Liability.

2c) To: MD, AXL

From: Appointed Actuary

Subject: Using No. 1 Fund PRP as capital for No. 2 Fund

Dear MD,

I would like to make the following points in response to your proposal to grow the Policy owners Retained Profits (PRP) in the No. 1 Fund by reducing bonus and crediting rates, and to transfer surplus shareholder capital from the No. 1 Fund to the No. 2 Fund.

It is the responsibility of the directors of AXL to decide on how profits should be distributed. However, before making any distribution the directors are required by the Life Insurance Act to take advice from the Appointed Actuary on the consequences of the distribution.

The directors should also consider the potential for conflicts of interest between shareholders and policyholders interests and should be aware that the Appointed Actuary’s advice in such a situation would need to give adequate protection to policyholders’ interests.

The actuary is required to consider the equity of any distribution to participating policy owners. Equity takes into account the reasonable expectations of these policy owners. **Reducing the crediting rate in order to build up PRP may not be considered equitable.**

The shareholder funds required to support the No.1 fund comprise Shareholders Capital and Shareholders Retained Profits (Participating). The Life Insurance Act requires that Shareholders Retained Profits (Participating) be maintained at a level of at least 25% of PRP. So by reducing the distributions from PRP the distributions to shareholders from the No. 1 Fund could also potentially be reduced. However this restriction will have no impact on the total shareholder funds required in the No. 1 fund if the amount of shareholder funds required to cover the capital adequacy requirement and target surplus exceeds the Shareholders Retained Profits (Participating).

As participating business is no longer sold in Australia there is no direct competitive pressure on crediting rates or bonus rates. However, policy owners have many alternative avenues for investment and a reduction in crediting rates and bonus rates is likely to result in an increase in lapse rates. This could increase profits in the short term for the conventional business as CTV is less than policy liability. The reverse is true for investment account. The embedded value may reduce for both classes of business due to the lower volumes of business persisting over the long term.

The crediting rates are likely to be quite low already as the policy liability plus PRP is significantly lower than the CTV.

If PRP is allowed to grow indefinitely it will eventually become large compared to the remaining policy liabilities. There would be issues around what to do with it as the Life Insurance Act only permits it to be distributed to participating policy owners.

Alternative sources of capital for the No. 2 Fund include:

* Raising capital from external sources – either equity or subordinated debt
* Reducing distributions to shareholders (e.g. reducing or eliminating
* dividends)
* Reinsurance

Yours sincerely, Appointed Actuary

**Q3** a) *The reasons for carrying out an analysis of change in embedded value are:*

* To assist in understanding the results
* To provide information to management and other interested parties
* As a check on the accuracy of the calculations
* To relate the assumptions to experience thus indicating areas where the assumptions may need revising
* To indicate to management where action needs to be taken to improve experience.

3b) *Lapse and mortality experience under EV differs from the analysis of profit because:*

* **EV lapse experience includes future profits and capital releases while analysis of profit only includes current year experience**: Lapse and mortality experience affects the value of future profits and capital releases as well as current year profit. In the Embedded Value analysis of change, **future impacts** of assumption changes are capitalised and reflected in the current year movement. In the analysis of profit **only the current year’s experience** is reflected as assumption changes are absorbed in profit margins (where they exist).
* Different tax treatment: In the EV analysis value for franking credits at a proportion of face value will be included. The analysis of profit will be either gross or net of tax.

*Mortality assumptions may have been improved despite poor experience because:*

* The poor mortality experience could be due to a small number of large claims, or random fluctuations in experience from year to year.
* The period of investigation for setting the assumptions is likely to be much longer than 1 year.
* The end of the investigation period will be prior to the valuation date as the assumptions are usually set in advance of the valuation, meaning that the adverse experience may have occurred after assumptions were set.

*Impact of a change in asset mix on embedded value:*

* The capital required will increase due to a higher resilience reserve. This will cause a reduction in embedded value.
* The investment assumption will increase causing an increase in embedded value.
* The discount rate should increase as the riskiness of the business will increase. This would cause a reduction in embedded value (in theory this should offset the higher investment assumption).
* The net impact should be small and negative.

3c) (i) *It is wrong to calculate the second half VNB by subtraction:* as the assumptions for the full year VNB are different to those used for the first half. This means the 2nd half VNB includes the impact of assumption changes on the 1st half’s new business.

(ii) *An approximate value for the second half VNB can be obtained:* by pro-rating the full year VNB by sales volumes. 70/120 x 27.4 = 16.0m

Note: this is equivalent to applying the full year new business margin (full year VNB / full year new business volume) to the 2nd half year new business volume.

(iii) This table is showing a split of the full year VNB by 1st and 2nd halves. **The 1st half needs to be recalculated using end of year assumptions.** The most accurate way of producing this table would be to run first half new business data separately using end of year assumptions. The second half value of new business can be found by subtraction, or by detailed calculations.

3d) *YRT market will triple in size over the next 15 years.* *What factors would you consider in calculating this appraisal value?*

* The appraisal value would be based on the embedded value plus a multiple of last year’s value of new business.
* Franking credits should be excluded as they have no value to an overseas parent.
* The value of last year’s new business may need to be adjusted so that it fully reflects the new premium rates (particularly for level premium business).
* Both EV and value of future new business could be adjusted to allow for lower overhead expenses. These will come from 2 sources – the tripling of new business, and the potential synergies with QTF.
* The new business multiplier will be calculated allowing for growth in sales so they triple over 15 years. The growth rate thereafter should be inflation plus a modest margin allowing for long term economic growth.
* The discount rate used in calculating the new business multiplier should be higher than the EV discount rate to allow for the greater risk.
* Lapse rates for both inforce and future new business could be affected by the sale of the business.
* There could be some allowance for future margin squeeze.

**Q4** a) *The actual claims loss ratio will be* cost of claims incurred / premiums **earned**.

The cost of claims incurred for the year can be calculated as:

* IBNR + RBNA + CICP:

- where all items are calculated at the valuation date on current best estimate assumptions;

- only claims incurred during the year are included;

- all items are discounted to date incurred (probably mid-year on average) using the risk free interest rate applying at the valuation date.

* plus actual claim payments made during the year for claims incurred during the year, again discounted back to date incurred.

The premiums earned for the year can be calculated as:

* premiums received less increase in unearned premium reserve (which could be expressed as the expected premiums earned on the schemes exposed over the year)

4b) *Additional steps to take to calculate Best estimate claims loss ratio*:

* Use a longer investigation period as one year is unlikely to be credible
* Consider trends in the experience
* Consider probable future trends (e.g. changes in experience due to the economic downturn)
* Other sources of information could be considered (e.g. industry analyses, reinsurers).
* Any change in premium rates during the investigation period needs to be allowed for.

4c) *Other information required to calculate the deficiency reserve include best estimates of:*

* renewal expenses (including claims expenses)
* risk free interest rates
* lapse rates
* premiums inforce at the valuation date
* unearned premiums at the valuation date
* the period until premium rate guarantees expire

There will also have to be an allowance for the asymmetry in the profit sharing. Profit shares for some policies will be greater than zero, even though the disability business as a whole may be in loss recognition.

4d) To: CFO, AJAX Life

From: Appointed Actuary

Subject: New Group Disability Contract

Dear CFO

I understand your concerns about the potential volatility of profit from the new disability contract and your desire to smooth profits. However there are a number of restrictions which limit the ability of the company to smooth profits.

The Life Act requires Appointed Actuaries to comply with actuarial standards including AS1.04.

AS1.04 requires best estimate assumptions to be used in determining policy liabilities, so deliberately lowering (or overstating) the results is prohibited. It is not possible to smooth the profits by using other than best estimate assumptions.

There will naturally be some smoothing of the best estimate assumptions since the assumptions are based on experience over several years and extremes of experience tend to be ignored in setting assumptions for the future.

The auditors / actuarial auditors will be auditing my valuation and any deliberate bias in the valuation will most likely be detected.

My advice to the Board is to assist them in signing off that the financial statements give a true and fair view of Book Life’s financial position and that they comply with relevant accounting and professional standards.

AS1.04 includes a concept called a Related Product Group (RPG). The requirements for establishing a separate RPG for the new contract are subjective – it depends on how similar the benefit characteristics and pricing structures are to the existing group disability contracts. The new contract has some differences with the existing disability portfolio but the differences are not obviously sufficient to require a separate RPG.

The Standard requires that capitalised losses must be assessed at the RPG level.

If the new contract is combined with the existing contracts in a single RPG, the profits from the new contract will be capitalised to the extent that they can be offset against the capitalised losses from the existing contracts. This will cause a jump in profits for this reporting year followed by a fall in expected profit next year.

In future years I would expect profit to be more stable with a single RPG as further capitalised losses are less likely to occur with a single RPG. Losses in one part of the RPG can be offset against profits in other parts.

One problem with having two RPGs is that the solvency and capital adequacy requirements may be higher. If there are two RPGs the MTV / CTV minimum will apply at a finer subdivision of the business. In addition the solvency liability must not be less than the BEL for each RPG.

Under the method used for determining policy liabilities for the existing contracts profit margins emerge as claims are incurred. An alternative is to changes the method so that profit emerges as claims are paid. Under the current method changes in CICP, IBNR and RBNA flow directly to profit. It would be possible to add profit margins to each of these reserves, effectively spreading the emergence of profit over a longer period. The profit margins would act as a dampener – absorbing the changes in CICP, IBNR and RBNA which are due to changes in non-economic assumptions. This would reduce the profit emergence from the new contract in the first year or two as these profit margins accumulate.

There would not be any impact on the solvency or capital adequacy requirements as profit margins do not form part of these requirements.

In order to minimise profit volatility the assets backing the group disability business should be highly rated fixed interest securities matched to the term of the liabilities.

Further reduction in volatility could be achieved through reinsurance. This would reduce the profits expected from the business but would also reduce the capital requirements. A stop loss arrangement could be used to put a limit on potential losses. Alternatively a quota share arrangement could be used.

Regards, Appointed Actuary

**Q5** a) The sections included in the FCR where comments about the impact of the pandemic will be appropriate are:

* Policy liabilities and profit
* Embedded or appraisal value
* Pricing – premium rates for new and existing business, and conditions for accepting new business.
* Solvency and capital adequacy requirements
* Target surplus
* Additional capital requirements
* Sources of additional capital
* Distributions to shareholders and participating policy owners
* Adequacy of reinsurance
* Operational risks (e.g. impact on unit pricing if staff are all sick)
* Suitability of investments – liquidity requirements for increased outflows

5b)

|  |  |  |
| --- | --- | --- |
| Step 1 – value of future profits for in-force | **VFP** | = BEL (basis B) + value future profits (basis B) – BEL (basis C or D) |
| old mortality | 152.7 [A] | *=-55+499\*30%-(-58)* |
| new mortality | 135.7 [B] | *=-55+499\*30%-(-41)* |
|  |  |  |
| Step 2 – calculate profit margins on new business at inception. | **Profit margin** | = -BEL / PV claims |
| old mortality | 23.6% [C] | *=-(-21)/89* |
| new mortality | 20.9% [D] | *=-(-19)/91* |
|  |  |  |
| Step 3 – calculate value of future profits for new business at the valuation date | **VFP** | = profit margin x PV Claims |
| old mortality | 21.5 [E] | *=[C]\*91* |
| new mortality | 19.4 [F] | *=[D]\*93* |
|  |  |  |
| Step 4 – calculate profit margin for in-force and new business combined | **Profit margin** | = VFP / PV Claims |
| old mortality | 30.2% [G] | *=([A] + [E]) / (91 + 485)* |
| new mortality | 26.1% [H] | *=([B] + [F]) / (93 + 502)* |
|  |  |  |
| Step 5 – calculate planned profit for 2010 | **Planned profit** | = profit margin x expected |
| old mortality | 11.8 | *= [G]\*(4 +35)* |
| new mortality | 15.1 | *= [H]\*(6+52)* |

5c)

* AS1.04 requires that best estimate assumptions must be used in determining the policy liability. Therefore the 50% loading on mortality rates for 2010 should be used for calculating the BEL.
* The future profits are positive even with the increase in mortality for 2010 so the basis chosen will have no effect on profit reported in 2009.
* The basis chosen will affect the emergence of profit in 2010 and beyond.
* The profit carrier must be chosen so that profits are earned on the later of the provision of a service to the policy owners and the receipt of income relating to that service.
* Using best estimate claims as the profit carrier will bring forward the release of profits in 2010. Whilst this conforms to the principles of AS1.04 (the service is provided when claims are made) it is not reasonable to report higher profits as the result of a pandemic.
* The profit carrier can be changed providing this does not result in a release of profit at the date of change.
* Alternative profit carriers are premiums and long-term claims (that is without the spike in mortality in 2010).
* Using premiums as the profit carrier would bring forward the release of profit margins but not as much as using best estimate claims. Again it does not seem reasonable to report higher profits as a result of a pandemic.
* Using long-term claims (i.e. excluding the increase due to the pandemic) as the carrier will result in a slightly lower profit in 2010 and all subsequent years as a result of the pandemic. This is because the extra death claims expected in 2010 will increase the BEL and reduce the value of future profit margins at 31/12/2009. But the value of the profit carrier at 31/12/2009 will be unchanged. Therefore the profit margin (and planned profit emergence in all future years) will be slightly lower as a result of the pandemic.
* **Retaining the old mortality assumptions** would allow the extra claims in 2010 to emerge as an experience loss. **The extra claims could be treated as a one-off and not included in the best estimates**. This is similar to the concept of one-off expenses which are allowed for in AS1.04. But AS1.04 does not mention one-offs in regard to other assumptions.
* The assumptions and choice of profit carrier should be discussed with:
  + Auditors (as they will have to approve it)
  + Senior management (as they need to be aware of the effect on future profit emergence)
  + Other members of the actuarial profession.

**Q6** a) *The key differences between MCEV and EV are:*

* **Discount rate:** the use of a risk free rate of investment return instead of best estimate
  + The discount rate will be the risk free rate plus 1%. Under the traditional method, the discount rate would be risk free plus a margin of typically 3% to 5%, reflecting an equity risk premium.
* **TVFOG:** There is an explicit deduction of the time value of financial options and guarantees for MCEV. Under EV the allowance for the value of financial options and guarantees is implicit in the choice of discount rate.
* **VIF:** The VIF for MCEV only includes future profits (excluding investment returns on required capital). **For EV the VIF includes investment returns (net of tax and investment expenses) on regulatory capital and the present value of releases of regulatory capital.**
* **ANW:** The ANW for MCEV includes both required capital and surplus capital. **The ANW for EV only includes surplus capital.**
* The changed definitions of VIF and ANW don’t affect the total EV. It is just a different way of splitting it.
* **Cost of capital:** MCEV includes an explicit cost of capital. **For EV it is implicitly included in the VIF.**

6b) *Roll-forwards MCEV:*

* VIF is discounted at the risk free rate. Deduct the profit emerging.

VIF at end of year = 972 \* (1+5%) – 66

* The ANW rolls up with interest net of tax. Add the profit emerging.

ANW at end of year = 275 \* (1+5%) + 66

* The CoC at the end of the year can be deduced as follows:

The value of distributable profits (VIF – CoC + RC) rolls up at the risk free rate plus the 1% margin. The VIF rolls up at the risk free rate. The RC rolls up at the risk free rate net of tax. CoC can be calculated as a balancing item

CoC at end of year = [(972–167+220) \* (1+5%+1%) – (972+220) \* (1+5%)] + 220\*5%\*30%

6c) *Comparison of MCEV and EV*

**Participating business:**

* **The main factor determining the future profitability of participating business is the level of future investment returns.**
* If there is a significant proportion of equities and/or property in the asset mix backing the participating business, the MCEV will use a much lower investment return assumption than the traditional EV.
* In addition, there is a deduction for the time value of financial options and guarantees. This could be significant if there are equities and/or property in the asset mix.
* The impact of lower future investment returns and the deduction for TVFOG are likely to be bigger than the impact of the lower discount rate (unless the asset mix if predominantly fixed interest).
* The MCEV is expected to be lower than the traditional EV.

**Investment linked:**

* **The profitability of investment linked business is determined by fees less expenses.**
* Asset based fees are typically the main contributor to profits.
* Under MCEV the asset based fees and investment management expenses will be projected to grow at a lower rate than for traditional EV (if typically a majority of the assets are equities and property).
* However, the lower discount rate will offset the effect of lower future investment returns. The present value of asset based fees less expenses will be little different for MCEV and TEV. The precise relationship will depend on the asset mix and the discount margin that was used for the TEV.
* Some fees and expenses are a percentage of premium or a fixed dollar amount per policy (perhaps increasing with CPI). The change in the investment return assumption for MCEV will have no effect on the projection of these fees and expenses. The lower discount rate will increase their present value. To the extent that there is any mismatch between these fees and expenses the MCEV could be different from the traditional EV.
* The MCEV is expected to be similar to the traditional EV.

**Lump Sum Term:**

* **The assets required for lump sum term business are typically quite small, since the capital adequacy requirement is usually driven by the CTV which will be small.**
* In addition, the asset mix is typically mainly fixed interest.
* The change to the investment return assumption will therefore have only a small impact on future profits (where these include the investment return on capital).
* The lower discount rate will have a much larger impact than the lower investment return assumption, assuming a reasonable level of profits.
* The MCEV is expected to be higher than the EV if the business is profitable.

6d) *Changes following on from adoption of MCEV may include:*

* Pricing should be changed to be consistent with the MCEV methodology.
* **Term** is likely to become a more attractive product (if profitable) as MCEV is expected to be higher than the EV if the business is profitable.
* Greater sales focus on term business.
* Possible increase to commission rates for term.
* There may be opportunities to reduce the prices of term.
* There should be a greater weighting of assets towards fixed interest (except for investment linked). **Risky assets depress the MCEV** as the capital adequacy requirement is higher and there is no compensating increase in future investment returns.
* **For the participating business**, there should be a greater focus on reducing the TVFOG (subject to policy owner reasonable expectations). This can be done through manipulating the asset mix, perhaps including the use of derivatives.
* There is unlikely to be any effect on the pricing or product design of **investment linked** business as the MCEV is expected to be similar to the traditional EV.