**Q1** a) & b) please see the spreadsheet

1c) i. Policyholders may choose to leave the company due to the lower return when compared to other competitor. More withdraws may occur. As a result, VIF will decrease due to the decreasing size of business as profit is lost when policyholder decides to lapse.

A higher lapse stress will be applied in determining the PCA.

Management fee will reduce as it is also determined by the amount of investment return, which is lower than expected. Less fee income will lead to a decrease in VIF (and EV).

ANW will be increase as a result of the lower capital requirement which is the result of the above 2 reasons. However, ANW will increase slightly but not more than the offset by VIF decrease since profits have been lost.

This impact could be offset by the decrease in risk discount rate to some extent, which is driven by the lower investment return. The shareholders may also adjust their expectations on the risk discount rate accordingly.

ii. Not much impact on policyholders’ behavior is expected given that the majority of the policyholders withdraw above the minimum rates.

Expense may decrease since there is no need to monitor the minimum withdraws anymore. This will reduce the administration cost and might also simplify the admin system.

1d) i. It is more straightforward to communicate the results to the management team and other non-technical audiences.

It is easy to compute by using method 2 and hence it could be more available on a timely manner to meet the management team requirement.

ii. TO: CFO

From: Reporting Actuary

Memo: Response to the proposed VNB calculation method

Dear CFO,

The proposed VNB calculation method by simply multiplying three to the last year VNB has raised my attention. The method may not be seen appropriate due to the following reasons:

* The increasing volume of new business will significantly increase the capital strain at front. Cost of capital should be taken into consideration when we value the new business. Since it is very likely to require more capital, the cost may offset the growth in value of writing new business.
* Expense may also increase as a result. Despite the potential economic scale effect, the total expense outgo might still increase more than expected as we may need to hire more people to manage the fund, including the one-off expense of upgrading our admins system to allow for the increasing business.
* The VNB of last year may not reflect the current assumptions change during this year. We may want to recalculate the VNB based on current perspective.
* Due to potential reputation damage on the whole industry (the fraud of other company), the business may not grow as expected as customer may shift to other industry to invest their money. We should leave some room for the adverse trend that may occur.
* We also should have a higher risk discount rate in this regards when the business is rapidly growing since there is more uncertainty and volatility, which will reduce our VNB in general.

All of above reasons may make the VNB calculation based on last year VNB not appropriate and hence the VNB may not increase by 3 times exactly. I will recommend a smaller capitalization factor.

Please let me know if you would like to discuss further.

Kind regards,

Actuary

**Q2** a) TO: CFO

From: Actuary

Memo: IP experience deterioration

Dear CFO,

With regards to the recent IP experience deterioration, I would explain how the strengthening the assumptions would impact the required capital (PCA):

Incidence Rate

The incidence rate may increase due to the experience deterioration. It will impact on a higher new claim amount, larger size of disabled lives reserve (DLR) and the claim in course of payment (CICP) will also increase. The increasing size of claims will lead to an increase in Insurance Risk Charge and a higher PCA.

Termination Rate

The decreasing termination rate would reduce the amount of claimants who recover from being on claim and go back to work. As a result, the DLR would be expected to increase.

Delay in claim notification period

IBNR is expected to increase as we may assume there is more unknown claims about to come in the future.

All there assumption changes will potentially cause loss recognition and increase the amount of our claim reserves (IBNR, DLR). Since the APL and Stressed PL are all on termination value (claim reserves) basis, the increase on claims reserves will result in a higher IRC and PCA in the end.

I would like to recommend the following actions to be taken to improve our capital position:

For current capital position:

We may ask additional capital injection from the parent in case any breach of the capital requirement.

For current capital position:

* We could decrease the retention and cede more business to the reinsurer to reduce our liability of payment. The capital requirement will be also reduced and improve the capital position. Asset concentration risk may also increase as part of the side-effect.
* Increase the premium of IP product: this may lead to more lapses and less new business. However, both of them can help us regarding the capital position.
* Change the product design by restricting the longest payment period, say 2 years. This will reduce the longer duration claims hence reduce the size of DLR, where DLR is most impacted by the termination rate assumption change.
* Strengthen the claim management process and rehabilitation program so that it could help more claimants go back to work

Kind regards,

Actuary

2b) i. At the launch of the company (and the IP product), the company is less experienced in selling the IPP product and have no historical experience compared to competitors. So the possible deviation from the BE assumptions is relatively larger.

Due to the low price that it offered along with leading product features. This exposes ABC to a very vulnerable position compared to competitors.

The underwriting and claim management process had not been tested back then. These may not deliver expected experience.

There is more uncertainty over the volume and business mix of new business. All these uncertainties are supposed to reflect in the stress margin.

ii. I would review the demographical and geographical business mix of the existing portfolio to detect any concentration which is vulnerable to any event risk.

I will compare the margin against other competitors and also ask opinions from external consultants.

iii. Premium is waived for those being on claims, so this will be only applicable to active lives and new business. They are likely to shift to competitors if there is an increase in premium.

The company usually cannot detect the poor experience and there is a longer delay when they manage to update the assumptions.

In addition, the assumption is reasonable only if there is still new business in 12 month time. Given the current situation if PCA coverage ratio has dropped significantly, we may be banned from issuing new policy by the regulator.

If our business as usual will not be affected seriously, we probably will be able to increase premium in 3 years’ time after valuation date.

The maximum level of reprice should be discussed with the reinsurer as well, given they will pay 100% commission on the **risk** **premium** only at the moment. Also, we need to pay initial commissions to adviser based on **office premium**. As a result, potential capital strain may arise if we increase the premium too much while we still receive the reinsurance commission on the previous risk premium.

2c) i. The regulator may be concerned about our target surplus:

* It does not take the cost of capital into consideration. No return required from shareholder is reflected in our target surplus policy.
* It does not reflect the real probability of breaching the capital requirement. 50% of PCA could represent different probability under different scenarios.
* It does not consider any regulatory adjustment on the PCA. This may emerge if the regulator thinks it is necessary to apply any adjustment due to the deterioration in market.
* No time horizon is defined.

An alternative could be: set the target surplus so that there is 0.5% likelihood that our capital position will fall below the PCR within 1 year time.

ii. The regulator can take following actions regarding the IP business:

* Stop the company from selling new business: the capital strain will reduce but more importantly, there is no more loss-making products being sold. Regulator may find there is a need to stop writing new business so that Future capital position will not continue to become even worse.
* Require more capital to be set for IP business by imposing a supervisory adjustment: this will strengthen the current capital position immediately. However, it may be difficult for the company to raise the additional capital and the new capital may come with a cost.
* Ask the company to review the assumptions and product design: strengthen the assumptions and remove irrelevant/unnecessary features so that the new IP business may become profitable. No impact on the current but future capital position will become stronger.

iii. Industry report, such as the reports from the actuaries institute. This will provide more insight on the industry.

Similarly, frequently communicate with the reinsurer as they may have exposure to more than one company and potentially the whole industry. Reinsurer will always be aware if others companies have any experience. If their reported profit has reduced on IP business, it may indicate we could suffer from the same trend.

**Q3** a) i. The probability (confidence level) of ruin has been defined in the overseas basis (75%) where random stress margin could be determined based on appointed actuary’s judgement on the risk profile of the existing portfolio.

The risk margin also contains all the possible unfavorable outcomes, not solely coming from the randomness.

The random stress is only applied in the 1st year while risk margin is applied throughout the life of the policy.

ii.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **$ million** | **At New Business Commencement** | **At End of Year 1** | **At End of Year 2** | **At End of Year 3** | **At End of Year 4** | **At End of Year 5** |
| **PV Premium** | 100.0 | 90.0 | 81.0 | 73.0 | 66.0 | 59.0 |
| **PV Claims** | 60.0 | 55.0 | 50.0 | 46.0 | 42.0 | 38.0 |
| **PV Expense** | 32.0 | 29.0 | 26.0 | 23.0 | 21.0 | 19.0 |
|  |  |  |  |  |  |  |
| **Table 2: Template for Question 3 a ii) response** | |  |  |  |  |  |
| **$ million** | **At New Business Commencement** | **At End of Year 1** | **At End of Year 2** | **At End of Year 3** | **At End of Year 4** | **At End of Year 5** |
| Best Estimate Liability | -8.0 | -6.0 | -5.0 | -4.0 | -3.0 | -2.0 |
| **Under MoS** | | | | | | |
| Value of Profit Carrier | 60.0 | 55.0 | 50.0 | 46.0 | 42.0 | 38.0 |
| Value of Future Profit | 8.0 | 7.3 | 6.7 | 6.1 | 5.6 | 5.1 |
| Reported Profit |  | 0.7 | 0.7 | 0.5 | 0.5 | 0.5 |
| **Under Difference 1 (Risk Margin Percentage 10%)** | | | | | | |
| Policy Liability | -2.0 | -0.5 | 0.0 | 0.6 | 1.2 | 1.8 |
| Total Cashflows |  | 2.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Reported Profit |  | 0.5 | 0.5 | 0.4 | 0.4 | 0.4 |
| **Under Difference 1 (Risk Margin Percentage 15%)** | | | | | | |
| Policy Liability | 1.0 | 2.3 | 2.5 | 2.9 | 3.3 | 3.7 |
| Total Cashflows |  | 2.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Reported Profit |  | 0.8 | 0.8 | 0.6 | 0.6 | 0.6 |

The profit under MoS is smooth and gradually released in similar trend when compared 2BRICH basis. However, the 2BRICH basis releases more profits when the risk margin is 15% whereas lower profits when the risk margin is 10%. Total profitability is also affected by different risk margin being used.

Non-economic assumption changes will not affect MoS profit for the current period. The change will be spread over the lifetime of the policy by a revised profit margin.

However, any claim assumption change will be more serve than MoS, as the change will not only impact the BEL but also the risk margin.

3b) i. Rationale: to identify the onerous contracts at inception and reduce the ability for cross-subsidization of those loss-making products.

ii. Admin system upgrade: this requires an intensive system change in order to achieve the new level of grouping. This will be challenging if there is limited time and resource available.

Data integrity: given some policies may be sold 20 years ago, does the company have the policy information to conduct such a grouping, say what if they did not record “issue year” when they first sold the policies.

The reporting will become more complex and there is a need to educate the audiences to understand the result under the new basis.

3c) i. DI is an income paying product whose duration might be as long as 20-30 years depending on the terms of benefit period. Especially, the duration of claims is in general longer than premium. Therefore, the discount increase may have larger impact on claims than premiums.

Given DI benefit does not depend on the performance of assets, a risk free rate is currently used under the current BEL calculation.

It is possible that a higher discount rate is used for DI, which may lead to a higher BEL than the MoS basis.

ii. The asset allocation strategy should shift to a more risky asset allocation as a result of higher discount rate being used. The investment performance should be more in line with the discount rate.

Select longer duration of asset to reduce asset liability mismatch and account for any interest movement in the future. Otherwise there is more penalties in the new basis.

3d) i. There should be trainings for the underwriting and claim management team.

The underwriting should be more stringent given there is less cross-subsidization effect. Profit is identified at a lower grouping level. Any trend in the market should be reflected into underwriting process in a more timely manner.

More focus should be put on claim management than before, as policy liability is more closely related to the claims due to the introduction of risk margin. Less incident claims or more terminations would generate more reported profit through the deduction of policy liability.

ii. There is no franking credit to be made to the overseas shareholder.

Consideration also needs to be given the difference timing of profit releases under the new basis. The dividend should align with the new reported profit.

Appointed Actuary needs to ensure the dividend does not exceed the reported profit.