

May 2019

Subject F202 — Life Insurance

Specialist Applications

EXAMINER'S REPORT

QUESTION 1

A South African life insurer has the following portfolios of business:

- **Annually renewable group risk business. The group insurance provides Death and Income Protection cover.**
 - **Term assurance business.**
 - **A portfolio of conventional with profit endowment business which has been closed to new business for 15 years (the other portfolios are still open to new business). The funding ratio at the previous valuation was 95%.**
- i. **Describe the reserving methodology that would be used to determine the liabilities for each of the three lines of business and list the different reserves that should be considered. (valuation basis not required)**

This question was largely book work and well answered. A general comment that applies throughout the paper is that candidates seemed to confuse reserves that would be set up for valuation purposes or liabilities that would be calculated for solvency / SAM purposes. These are not the same and this is quite an elementary concept to understand. In theory different values could be required depending on a variety of purposes – tax basis is another example.

The reserving methodologies to use are specified in SAP104.

With profit business:

Determine reserves on prospective discounted cash flow basis.

Include a Bonus Stabilisation Reserve (BSR).

The BSR will be the undistributed future bonuses earmarked for distribution, as the difference between the asset share and prospective reserves.

The BSR will be negative as a result of the funding ratio being below 100%.

Calculate a stochastic Investment Guarantee Reserve for any guarantees (e.g. vested bonuses).

Term business:

Determine reserves on prospective discounted cash flow basis.

The methodology may include the zeroisation of negative reserve.

Group business:

Reserves are determined retrospectively, except for Income Protection claims in payment.

The following retrospective reserves should be considered:

- Incurred but not reported claims
- Unearned premium reserve
- Deficiency reserve
- Experience refund / Profit share reserve
- Discretionary reserves
- Claim Expenses

For Income Protection business, you would need to consider whether IBNR is the time from claim occurrence to reported date or assessed and approved date.

Prospective reserve for Income Protection claims in payment reserve.

Other reserves that can be considered include

- Data deficiency reserve
- Mismatch reserve
- Outstanding claims reserves

The matching strategy of the business is reviewed on an annual basis before the financial year end.

ii. Outline the approach that would be used to match the liabilities.

This question was reasonably well answered. Better candidates provided more insight and detail around some of the complications that each of the products would introduce to the matching process.

The matching strategy should aim to match the liability profile and the currency of the liabilities.

Base the matching strategy on the projected cash flow profile of the business.

Term business:

The cash flows will generally be positive inflows in the beginning followed by negative outflows thereafter.

This will be influenced partly on premium patterns available.

The cash flows will also generally be long-term and could have a very long tail, especially if longer terms and increasing covers are offered.

Match the short-term cash flows with liquid investments such as cash and long-term liabilities with bonds.

There may not be assets available with long enough durations to match the long-term liabilities.

Derivatives such as futures or forwards can be used to increase the duration of the assets.

The liabilities will be zero or small early in the term of the policy and there will not be a lot of cash available to invest in longer term assets.

Derivatives are not capital intensive and can be used as an alternative to direct investment in bonds if there is not sufficient cash available.

Otherwise, invest in liquid assets in order to convert to longer duration bonds over time if derivatives are not available in the market.

If negative liabilities are not zeroised, it frees up statutory capital for other investments. There will however be additional solvency capital requirements when liabilities are not zeroised.

Group business:

The retrospective reserves of the group life cover are of a short-term nature, so invest mainly in cash.

Because of the reporting delays of disability business, the IBNR will have a longer tail. Could adjust matching for this.

Income Protection claims in payment have a long term, so invest in bonds.

The liabilities may be real in nature depending on any in-claim inflationary increases. Index-linked bonds may be appropriate for these.

There may be similar challenges to the risk business to match the long-term liabilities, especially where claim is expected to reach retirement ages.

With profit business:

The investment strategy will largely be determined by policyholder expectations, the PPFM and the investment mandates of the available with profit portfolios.

Policyholders will be expecting a high (at least $>$ inflation) return.

There should be sufficient exposure to equity and other higher yielding assets.

The PPFM will specify if the investment strategy should change if there is a negative BSR.

A negative BSR will generally be managed by the level of current and future bonuses.

The guaranteed components of the liabilities can be closely matched with fixed income investments.

As the book matures, increase the exposure to cash and shorter duration assets to smooth maturity payments and eliminate fluctuation.

Given the nature of the business and the availability of assets, the matching strategy will remain a challenge.

Perform sensitivity shocks to determine the acceptable level of matching given different movements in the yield curve (e.g. flattening curve, increase in yields etc.).

Over the last three months the entire yield curve has shifted downwards, more significantly at the longer durations. During the nine months prior to the yield curve shift, the duration of the assets supporting the long-term liabilities became much shorter than the duration of the liabilities for all lines of business.

The change in the matching position over the year is being reviewed.

iii. Highlight possible reasons for the mismatch before the downward shift in the yield curve.

This question was poorly answered. Many candidates did not mention possible changes to the liability profile at all. These candidates also only tended to pick up a couple of reasons for the asset profile changing.

Other unexpected changes to the yield curve could have occurred.

A change in the shape of curve might have changed the relative durations of the assets and liabilities, due to a different relative weighting of cash flows of the assets and liabilities.

The frequency of matching reviews. Review and rebalance the matching strategy more regularly and monitor the position after unexpected liability and asset movements.

The mismatch could have been deliberate.

The following may have changed the average DMT of the assets:

- re-investment of investment return
- maturing investments
- settlement of debts
- any other movements.

New Business might have changed the profile of the liability cash flows.

Additional income protection claims might have changed the profile of the liability cash flows.

Policies discontinuing and other movements that were different to expected might have changed the profile of the business.

iv. Discuss the likely impact on the following components of the valuation result due to the noted asset-liability mismatch and the change in yield curve:

- **Surplus**
- **Best estimate supportable bonus rate**

This question was poorly answered. Better candidates provided a broader range of relevant points. Better candidates also considered the specifics of the background to the question w.r.t the products and funding level etc.

Surplus

The discount rate to value the best estimate liability will have reduced resulting in a higher liability value.

Since the asset duration is shorter than the liability duration, proportionally, the asset value will increase by less than liability value.

The IGR will also increase as a result of the lower BSR.

There will therefore be a mismatch loss and a consequent drop in the NAV.

The Income Protection and whole life products' tails will be the longest, so the impact of the interest rate drop will be the most severe for these products.

The investment return earnings will be lower than expected, but this impact will be very small, compared to the impact of change in the long-term yields on the value of the assets and liabilities.

There will be no change to the retrospective Group liabilities.

Assets will have a short duration, so depending on the nature of the investments, there may be a limited increase in the value of the assets.

The actual Investment returns will also be lower than expected for a few months.

The cost of bonus (and shareholder transfers) will be higher as a result of the higher present value of future bonuses, but the expected drop in bonuses will reduce the shareholder transfers.

Resulting in a lower surplus.

Supportable bonus rate

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All things being equal, there will be downwards pressure on the supportable bonus rate, as the funding ratio dropped.

The PPFM will specify the calculation method and the extent of smoothing of the bonus rates.

With the funding ratio already below a 100%, the company would want to recoup the deficit over a reasonable time, e.g. 3 years.

The level of bonuses will therefore be lower than competitor bonuses with positive BSRs.

If the funding ratio is lower than 92.5% (negative BSR equal to 7.5%) it has to be disclosed in the Annual report of the company and an action plan be put in place. This may result in further reductions in the supportable bonus rate.

Over the course of the financial year, risk experience losses were made on the Group Income Protection business. This needs to be considered in the setting of the reserves, financial reporting and a possible review of the pricing assumptions.

- v. **Explain the likely impact of higher claims experience on reserves and the Embedded Value calculations (Income Protection business only)**

This question was well answered. Most candidates picked up the salient points. Some candidates seemed to not understand the mechanics of the change in reserves on NAV and VIF. This is basic application of embedded value knowledge.

The worsening in the risk experience can be as a result of:

- more incurred claims than expected (higher inception rate)
- claims lasting longer than expected (lower termination rate)

The inception and termination rates may have to be adjusted in light of the recent experience and expected future experience.

Reserves:

A strengthening in the basis and increasing reserves (decrease in termination rates) can have a substantial impact on the prospective claims in payment reserves and operating profit.

An increase in incurred claims could also result in a higher IBNR.

If investigations indicate that the premium rates might have been too low, a premium deficiency reserve might have to be raised.

The expense assumption may have to be increased as a result of higher claims underwriting expenses and reviews of existing claims in payment.

The net effect on the reserves will depend on reinsurance agreements in place. With a quota share agreement there will only be a proportional increase in reserves.

With a surplus agreement the impact may be even smaller, depending on the sizes of the claim and how much is ceded.

Embedded Value:

The NAV, VIF and CoC could be impacted.

VIF

With the increase in reserves, the projected future profits will be higher as the compulsory margins are higher.

This will increase the VIF.

NAV

NAV will decrease due to a higher liability occurring through the increase in reserves.

CoC

The solvency capital and cost of capital will increase as a result of the higher morbidity risk or lower termination rates.

The higher reserves will also have a secondary impact on the investment part of the solvency capital calculations.

The net effect should be reduction in EV (increasing reserves now, but new expected profit is released over time and is discounted in VIF).

With the deterioration in experience, a review of the risk assumptions in the pricing basis of the Income Protection business is being considered.

- vi. Describe how the risk assumption review should be performed as well as the factors that should be considered when performing the review**

This question was reasonably well answered. Better candidates provided a broader range of relevant points and also picked up on more than just the general review process points, e.g. whether the experience is industry wide or specific to company etc.

Perform an experience investigation of both the inception and termination experience to determine the best estimate assumptions.

This will be based on past experience, but consideration needs to be given as to how this relates to future expectations.

If the worsening experience indicates a deteriorating trend, then how this trend is dealt with will also be important. (Is it expected to continue, stabilize, reverse?)

Consider trends observed by the industry as a whole to establish whether the experience is evident in the industry or only applicable to the company.

Analyse the experience per rating factor

- Type of industry
- Age
- Gender
- Salary or cover bands
- Region
- Any other variables if available (e.g. occupation)

The rating factors used will depend on what is currently used by the company or in the market.

Part of the review would be to consider whether these factors impact the accuracy of pricing.

The experience would also be analysed by product specific factors

- Waiting Period

- Claim cease age
- In claim escalation
- Definition of disability

Compare local against international experience to investigate the relevance of international trends.

Ask the Reinsurers for their views on the risk experience, a review of the Income Protection incidence and termination rates or additional data that can be used in the analysis.

An investigation into the experience of larger groups or a subset of groups could be performed to identify groups or classes of groups that may require special attention. (maybe only mining schemes or white-collar schemes have worsened as an example).

The benefit compared to salary (replacement ratio) will have an impact on the tendency to claim as well as remain on claim. Could potentially include this as a rating factor in the analysis.

The impact of the economy needs to be considered when analysing Income Protection business. What has the state of the economy been over the experience investigation period and how would this have impacted the claims experience?

What are the views on economy into the future and how will this impact the future experience.

Consider the impact of regulatory, tax law or other changes. With the recent change in the taxation of Income Protection business, the after-tax benefits could now be more than the salaries of the insured, which increased the potential claims cost.

The expected future experience will depend on any preventative measures, for example improving the safety regulations and work conditions, regular health checks and rehabilitation programmes. Assess what is in place currently and if future improvements are planned.

Review the experience of the policy as a whole. Income Protection on its own may be loss making, but the profitability of the total offering of a package deal (e.g. including group life cover) may still be at the desired level.

Compare the marketability of current and proposed premium rates against competitor rates.

Perform scenario and stress tests on the premium rates to understand the impact of changing conditions and various scenarios.

Investigate the experience considering the terms of the reinsurance agreements, e.g. a surplus reinsurance agreement, will cap the risk experience. Review the reinsurance treaties in light of the recent experience.

QUESTION 2

A proprietary life insurance company has written accumulating with profits policies for the last ten years. It manages bonus declarations using both regular and terminal bonuses, which are normally declared annually. The company may apply a market value adjuster, if the investment market circumstances justify it and the policy contract allows it. The assets backing the policyholder liabilities are invested in equities, fixed interest investments and a small portion in cash. Business is sold largely through insurance intermediaries.

- i. Distinguish between the appropriate use of regular and terminal bonuses when distributing surplus. Also state the sources of surplus that are likely to be distributed by regular bonus and those that are likely to be distributed by terminal bonus.**

This question was reasonably answered. Many candidates struggled to generate enough points around the various sources of surplus and how they would be distributed.

Stable recurring sources of surplus will mostly be distributed through regular bonuses.

Volatile and uncertain sources of surplus will generally be distributed through terminal bonuses.

Regular bonus will generally be used to distribute investment income surplus.

However, capital appreciation, which can be very volatile, is likely to be distributed by terminal bonus.

Part of capital appreciation may be used to finance regular bonus if it is considered prudent to do so.

Terminal bonus will be used to distribute expense, mortality and withdrawal surplus.

Terminal bonus will also be used to distribute any mismatching surplus from other business.

General surplus on other business will probably be distributed through terminal bonus.

If the general surplus on other business is a regular stream of profits it may be used to support regular bonuses to a small extent.

If market value adjusters are applied (for example) at surrender, a proportion of the volatile surplus sources may be distributed through regular bonuses (as opposed to using terminal bonuses).

The approach by competitors utilizing regular and terminal bonuses, may also impact the company's final decision on the appropriate way to distribute difference sources of surplus.

ii. Describe the factors that the company is likely to have considered when setting the level of regular bonus when it first decided to offer accumulating with profits business.

This question was well answered.

Most important is the company's long-term view of the rate of return expected to be achieved.

This will depend on the with profit fund mix of assets.

This mix of assets will be influenced by the level of free assets in the fund.

For life products this will be reduced to allow for tax.

It will be further reduced to allow for the proportion of the return that the company wishes to distribute by terminal bonus.

This proportion may vary by the term of the policy. For example, the company might aim to distribute $2N\%$ of the proceeds of an endowment as terminal bonus (where N is the term of the policy).

The company may test the likely outcome of a proposed level of regular bonuses using a stochastic economic scenario generator. This will provide scenarios of expected future investment returns, as opposed to a long-term deterministic view.

This theoretical level of distribution will then be refined by reference to:

- Any guarantees on the policies.
- Any comments in policy literature, or the with profit guide, influencing the expectation of policyholders.
- Limitations or requirements based on the published PPFM for this particular product range.

- And, probably most influential, the level of bonus offered by the company's competitors since regular bonus will be a major factor for Independent Intermediaries in their choice of placing business.

After many years of steady equity growth, the equity market has now fallen for three years in a row.

iii. Discuss the factors that would have been considered in determining the declarations of regular bonus over the last three years

This question was relatively poorly answered. Many candidates did not go through all the actions that the company would have considering over the three years - views on the market, tracking the terminal bonus levels etc. Many candidates also missed the points around fairness for different generations of policyholders as well as a possible new series.

Consider the total return on the assets backing the policyholder liabilities, as opposed to only the equity performance.

The total return would have been influenced by mix of these assets and the performance of the other asset classes.

In addition to the equity performance, a major influence might be the returns on fixed interest investments and the proportion of cash held.

The company is likely to have considered the equity fall in the first year as a temporary feature or market correction, which would be followed by further growth.

Assuming that some terminal bonus cushion had been built up and the rate being declared was not greater than the long-term rate considered in part (ii) then the company would probably not have hurried to reduce regular bonus rates.

... unless they considered the change due to a fundamental realignment of the likely long-term rate of return.

Any reduction in regular bonus would have taken particular note of moves, or likely moves, by competitors.

With continued falls in equity values (in year 2 and 3) the scope for terminal bonus would be declining and so the pressure for a reduction in regular bonus would increase in order to at least slow the fall in terminal bonus capacity.

Policyholder expectations would be an important consideration here.

In particular for recent business, where theoretical terminal bonus would be negative, the pressure would be greater to reduce regular bonuses.

Stochastic returns from an economic scenario generator can be used to estimate:

- The likely probability of the funding level recovering
- The expected period required for a funding level recovery.

A new regular bonus series might be considered, for new business after a certain date, in order to:

- Re-align policyholder's expectations and
- Ensure fairness between different generations of policyholders.

A new regular bonus series would raise competition issues again, because it is more likely that a new series might be introduced at the end of the period of equity falls.

A higher rate of regular bonus might be paid to new policyholders to aid marketing since the bonus capacity available for older policies might be dampened for some time by the level of previous declarations leaving the funding level below 100% (i.e. book value being higher than market value)

A further issue likely to have been considered over this period will have been the frequency of bonus declarations and it is likely that the falls in the level of regular bonus will have been announced more frequently than annually.

This would have allowed rates to be reduced more quickly while also making each individual reduction smaller.

The size of any BSR might also have a bearing on how fast the necessary reductions were implemented.

- iv. Set out the benefit payments for the with profits business, considering both the payments at contractual payment dates as well as discretionary payments. Discuss how these different benefit payments would have been managed over the last three years.**

This question was either answered well or poorly. Candidates who understood the difference between contractual and discretionary payments scored well.

The maturity value (at the contractual maturity date) and the death benefit (at the date of death) are examples of contractual benefit payments.

Surrender and transfer payments (at the request of the policyholder) are examples of discretionary payments.

Initially, benefit payments were likely managed by reduction in terminal bonus.

Followed by further reductions in terminal bonus and the introduction of a Market Value Adjustment (MVA), where permitted, as the scope for terminal bonus reached zero for some policies.

Possibly with the introduction of the MVA before terminal bonus reached zero, as it is possible that systems would allow this to be introduced more quickly.

Allow the contractual payments to continue to benefit from positive smoothing. Without also passing too much of this benefit to discretionary payments.

Which might be particularly relevant if there had been a significant increase in surrender and transfer requests.

MVA will not be applied to contractual benefits such as maturity value and death benefit. [There might be other anniversaries (e.g. 10th) where the MVAs are not applied]

As terminal bonus disappears the regular bonus will also have been reduced to avoid exacerbating the situation further.

Although scope for this might be limited by policyholder's reasonable expectations and the reaction of competitors.

Any fixed or guaranteed death benefit would not be able to be adjusted.

QUESTION 3

A South African proprietary life insurance company with a significant with profit portfolio of products is considering options to maximize the value it generates for its shareholders.

- i. Explain the difference between the free assets of the life insurance company and the bonus stabilisation reserve (BSR) [also known as the bonus stabilisation account (BSA)] of the with-profit products.**

This question was well answered.

The solvency of the company would be maintained by ensuring the free assets are sufficient to cover any statutory capital requirements.

Free Assets = Assets – Liabilities (incl Current liabilities and Actuarial liabilities).

The BSR, although not contractually constrained, is considered part of the actuarial liabilities.

The company's smoothing policy could lead to contributions from, or subsidies to, a BSR.

This could affect the free assets. Should the BSR become too negative, support might be required in the form of a transfer from free assets.

The amount transferred is essentially a loan that should be repaid once the BSR is in a better position.

Generally, it would not be justified to transfer excess BSR to free assets, except in the case of a "loan" repayment.

ii. Describe the bonus stabilisation reserve (BSR) and how it is used to manage the solvency of a with-profits portfolio?

This question was well answered.

The BSR is a measure of the financial soundness of a with-profits portfolio.

The insurer could hold back a surplus for later distribution by setting up an additional (positive) reserve known as a bonus stabilisation reserve (BSR), determined as the excess of assets relating to the policyholders' portfolios over liabilities. (i.e. market value of assets backing liabilities less the book value).

If assets underlying a with-profits fund exceed the liabilities, then the fund has effectively declared a lower bonus rate than that supported by the distributable surplus that arose over a period. This results in a positive BSR.

The BSR collectively belongs to policyholders sharing in a fund and any positive BSR will be distributed to policyholders in the form of bonuses over time.

If the assets underlying a with-profits fund are less than the liabilities, then the fund has effectively declared a higher bonus rate than that supported by the distributable surplus that arose over a period.

Here, the insurer will need to recoup this additional bonus declaration over time by declaring lower bonuses than what could otherwise be supported by the distributable surplus arising.

The insurer will set up a negative bonus stabilisation reserve determined as the deficit of assets relative to liabilities, so that the insurer does not show a financial strain.

The extent of the negative BSR allowed for a with-profit fund is governed by the rules of the with-profit fund, the PPFM and the contract with the policyholder.

iii. Describe how the BSR and the free assets can be used as part of the financial management of the life insurance company to increase the value of the company to its shareholders

This question was poorly answered. Better candidates seemed to understand the options related to the proportion of distributed surplus that went to shareholders.

Use the BSR to accelerate the distribution of the surplus via existing participation rules.

The shareholder value of the company will be enhanced (i.e. the NAV will increase) if shareholder transfers are increased and/or emerge more rapidly.

Various methods exist to allocate surplus between shareholders and policyholders in a proprietary life office.

One example is the 90/10 method: Policyholders receive 90% of all distributed surplus and shareholders receive 10%.

Therefore, the BSR may be used to:

- Augment maturity benefits on the existing portfolio, which will increase transfers (i.e. the 10%) to shareholders in respect of terminal bonus payments.
- Support higher reversionary bonuses, which would accelerate its release (the 10%) to shareholders and therefore increase the value further.
- Fund a special bonus of which shareholders will then receive 10%.

But ensure that the distribution of the BSR is consistent with the PPFM documented.

The PPFM requirements are covered in Directive 147Ai issued by the PA (Prudential Authority).

Enhancement of shareholder profits by leveraging of the free assets without distribution of the BSR.

The free assets permit increased investment freedom i.e. greater investment in riskier assets such as equities.

This should result in higher investment returns, higher bonuses and consequently higher shareholder transfers (i.e. the 10%).

It also supports smoothing of bonuses which reduces the volatility of shareholder transfers and hence enhances their value.

The free assets can also be used to support greater rates of new business growth (by financing new business strain) than would otherwise be possible, hence greater future shareholder transfers.

Higher free assets demonstrate additional financial strength which may encourage higher new business sales (e.g. through independent intermediaries) and hence greater future shareholder transfers.

Higher free assets reduce the need to purchase re-insurance (for either risk transfer or financial reinsurance), which reduces costs and therefore increases potential bonus rates and shareholder transfers.

The free assets could also be used to:

- Purchase or develop a direct salesforce.
- Purchase another life insurance company or other operation.
- all of which have the potential to create higher future shareholder transfers and hence enhance shareholder value.

END OF MARKING SCHEDULE