

Actuarial Society of South Africa

EXAMINATION

1 November 2013 (am)

**Subject F202 — Life Insurance
Specialist Applications**

EXAMINERS' REPORT

QUESTION 1

- (i) **Describe the elements that will make up the shareholder value of the Life Insurance Company and briefly explain how this value will change from year to year.**

This question was answered well by most candidates. Those who did not score well did not seem to understand the NAV & EV concepts which were central to most of question 1. Candidates tended to ignore the subsidiaries which lost marks.

Shareholder value will consist of the net asset value of the Life Company.

This would include the net asset value of the two subsidiaries.

Plus the present value of future profits:

- For the Life Company this will be the release of valuation margins for prospectively valued business and expected future profits on retrospectively valued business (using and appropriate calculation basis).
- For the two subsidiaries, it would depend on how stable the business is expected. You would expect some allowance for future profits from these two entities.

This value is expected to change over time based due to the following reasons:

- The unwinding of the risk discount rate.
- Value of new business added during the period.
- Actual versus expected variance emerging during the year. These would include investment return variance, risk experience, withdrawal experience and expense experience.
- Impact of basis changes.

The cost of capital then needs to be subtracted. This is the cost of holding regulatory capital and serves to decrease value of the life company. It is calculated as the reduced return earned on holding capital in conservative investments compared to investing it in the business.

(ii) Describe how you would determine the value of the Life Company to be included in the published financial statements, mentioning the specific actuarial guidance you would consider.

This question was answered poorly. Some candidates did not pick up that an EV discussion was required. Most candidates also ignored the value of the subsidiaries which lost a relatively large number of marks in this question. Candidates also tended to go into too much detail with regards to the components that make up part of a value calculation, such as valuation and CAR rules.

Need to determine value in accordance with APN 107 (also give mark if reference is PGN 107).

The starting point would be to define covered business to be included in the calculations.

There is unlikely to be a good reason to exclude any of the business written in the Life Company, so this would be included in the definition of covered business.

Both the other two entities are material to the Life Company, so it would be necessary to include the business of these entities in the definition of covered business. Although it may exclude certain specific classes of business, as long as this is clearly defined and disclosed in the financial statements.

The embedded value (EV) of the Life Company will consist of:

- Free surplus attributed to covered business.
- Plus: Required capital to support the in-force covered business;
- Plus: Present value of future shareholder cash flows from in-force covered business;
- Less: Cost of required capital.

The EV will exclude the value of any future new business.

The free surplus is the difference between the total market value of assets in excess of the SVM liabilities and the required capital.

The free surplus would include an allowance for the two subsidiaries. For the Short Term Company this calculation would be based on the specific regulatory requirements of the FSB in respect of general insurance.

For the loans company, the free surplus will be equal to the net asset value attributable to the entity. This can be taken straight from the entity's financial statements as long as this is considered to be shown at fair value.

The required capital is the assets attributed to covered business where distribution to shareholders is restricted.

For the Life Company, this would be at least as great as the statutory CAR. However, it should be increased if internal requirements for capital are greater. Hence it is likely that a multiple of the statutory CAR will be used in the calculations.

For the both the Short Term Company and the Loans Company, the starting point would also be the regulatory level of capital and similarly increased based on internal requirements.

Any risk or internal capital requirements that arise as a result of the “group” structure, should be allowed for.

The present value of future shareholder profits will be calculated on a set of best estimate assumptions on a going concern basis.

Best estimate projection assumptions should be the same as the assumptions used to calculate the SVM liabilities at the same date excluding all compulsory and discretionary margins.

Assumptions would include, investment returns, risk experience, withdrawals, expenses, inflation, etc.

Premium increases should be modelled, despite being explicitly excluded where they lead to a decrease in the SVM liabilities. The allowance for future premium increases should be based on the best estimate take up rate expected.

For the Life Company, the present value of future profits, would consist of the release of valuation margins included in the statutory liabilities for prospectively valued business.

For retrospectively valued business, an assumption would be required in respect of how long the business would be expected to remain on the books, and based on this a present value of future profits calculation can be perform.

A similar calculation will be required for both the Short Term Company as well as the Loans Company. The key would be for these to be based on best estimate and consistent with previous years.

When projecting expenses or any other inter-group related items, it is important that the calculation does not double count any items. For example, if the Life Company administers elements of the Short Term Company’s business, the expense incurred should only be allowed for once.

An appropriate allowance for tax is required. This would include tax in the relevant policyholder tax funds as well as tax incurred when transferring funds to the corporate fund.

With the change in STC from a secondary tax on companies, to a dividend based tax incurred in the hands of the shareholder, you would most likely disclose the EV gross of STC. It is important that this is clearly disclosed in the published results.

In each case the calculation would be based on the projected net shareholder cash flow in future periods, discounted back at the risk discount rate.

The above calculation will need to be adjusted for the cost of holding the required capital.

The cost of required capital is the difference between the amount of required capital and the present value of future releases of this capital, allowing for future net of tax investment returns expected to be earned on this capital.

(iii) Describe the four fundamental accounting concepts that a South African Life Company needs to adhere to in calculating the profits that have arisen during the past year and how your value determined above deal with each of these concepts.

This question was largely a bookwork question with some application with regards to an EV comparison. Relative to this the overall level of the marks was poor. Candidates either knew it and scored well or did not know it and score poorly. More than expected did not know this material. The better candidates also scored highly in the application marks with some scoring very highly and differentiating themselves from the other candidates easily.

The “Going concern” principle, where profits are calculated assuming the company will continue to carry on with normal business operations for the foreseeable future.

The “Accrual” principle, where revenue and costs are recognised as they are incurred, rather than when money is received, unless this is contrary to the prudence principle.

The “Consistency” concept, where like items are treated similarly both within the reporting period and from one reporting period to another.

The “Prudence” principle, where revenue and profits are not anticipated in advance of them arising and provisions are made for all known liabilities.

Going concern:

The main item in the basis affected by the going concern basis would be the expense assumption used in the present value of future profits calculation.

The expense will be projected assuming the company remain open for new business.

The expenses will be spread over both the existing book as well as the expected new business to be written in the future.

The inflation assumption would also be set at a level assuming the company remains open to new business.

Accrual:

This is achieved by projecting the net shareholder cash flows according to when they will be incurred, and not when the cash is expected to be received (if different)

This means that premium income, investment income and other income related items will be projected based on when they are expected to be received rather than when they are actually received.

Expenses would be accrued in the period to which they relate.

Consistency:

The assumptions used in the present value of profits calculation should be consistent with one another. E.g., the investment return, inflation rate and risk discount rate assumptions.

If an assumption changes dynamically, other relevant assumptions should also change accordingly. E.g. If investment return is based on a curve over time, the inflation rate should similarly change over time based on a curve.

Assumption used in the current period should be consistent with assumptions used in prior periods. Unless a fundamental shift in assumptions are experienced, justifying a change in assumptions.

Assets and liabilities should be projected on a consistent basis and methodology. E.g. If investment returns are projected using a stochastic model, similar returns should be used to discount the liabilities emerging in the respective periods.

There should be consistency between the assumptions used in the present value of profits calculations and the underlying SVM liabilities.

In particular, the assumptions used to calculate the SVM liability at each point in the future should be more conservative than the assumption used in the present value of profits calculation.

Prudence:

Achieved by reserving for all known liabilities, including adequate allowance for the cost of any guarantees on the unit linked business.

Choosing assumptions that are realistic, and not optimistic.

Where there is uncertainty in the level of certain assumptions, a margin for prudence would be added.

Any changes in the future level of assumptions due to management actions, would only be taken into account if there is a sufficient level of certainty that the actions will actually take place and have the desired impact.

(iv) Explain to the director how you would go about determining the price of the Life Company should they consider selling the Company, highlighting how this would differ from the published value of the Life Company.

This question was relatively well answered. It required candidates to explain the adjustments required to move from an EV to appraisal value.

Price would be based on the appraisal value of the company.

Hence in addition to the value determined above, we would need an adjustment for the value of potential future new business, the goodwill element.

The value may be based on the latest year's new business plus expected future growth.

Need to allow for any expected impact of market changes and the impact of these on both volumes and/or margins.

You would therefore look at the value of new business used in the above calculations and determine a realistic long term level to use in the calculations.

We would not want to overstate any negative impact in order to keep the value higher. To allow this we would want to allow for reasonable actions management would take to protect profits. E.g. Reduced commissions or increased management fees (to the extent allowed) on the unit linked business.

The goodwill will be the sum of the values in all future years appropriately discounted.

Alternatively, a more simplified approach could be taken by applying a multiplier to the current new business value (e.g. 5 to 10 times the current new business value).

As we are looking at a price we would expect to receive in a sale, we may want to use slightly more optimistic assumptions than used above.

The main assumption that would be subject to change would be the risk discount rate used in the calculations. Depending on who the price calculations is performed for, the risk discount rate would need to take into account their view of the risk inherent in the company.

The price arrived at could be sense checked against information from recently traded company shares, taking into account the impact of market sentiment and the liquidity of the company shares.

Although appraisal value is theoretically correct, companies have traded at lower than AV and even EV.

(v) Explain how you would go about allocating an appropriate expense allowance for the two subsidiaries to allow each entity to publish realistic results.

This question was relatively well answered. It required candidates to provide a practical solution for performing an experience analysis for a group with subsidiaries with different business lines.

The starting point would be to identify the total expenses.

- Decision would need to be made whether actual expenses from previous year are used or budget. Budget may be better estimate.

Any one-off expenses would need to be identified and subtracted.

The next step would be to differentiate all expenses between :

- Major line of business;
- Direct, indirect and overhead expenses.

Direct expenses are defined as expenses that can be directly attributed to the two subsidiaries. E.g. The claims staff salaries that only work on the short term insurance claims.

The direct expenses are allocated to each entity based on the actual expense incurred.

The indirect expenses are in respect of service departments providing assistance to more than one entity (e.g. the actuarial department).

Need to find an appropriate way of allocating the indirect between the 3 companies. If time sheets are maintained (or a recent detailed time study), these can be used to split the costs between the 3 companies.

However, in the absence of timesheets an appropriate alternative basis needs to be used. This could be done on the volume of work required. For example, for the service call centre, the call volumes for each of the entities can be used to split the call centre expense. For the actuarial department, the volume of in-force business could be used. [Award marks for any other sensible examples]

Notional rental cost need to be allocated to the companies. This allocation needs to be based on a market related rent for similar properties. The specific costs can then be determined on the floor space each entity occupies.

Overhead expenses are in respect of central departments that do not directly work on any one of the entities and effectively have a group function. E.g. the salary of the CEO. A potential split could be based on the asset base of the companies or the volumes of business.

Renewal expenses will be treated differently to initial expenses (only relevant for VNB)

QUESTION 2

- (i) **Discuss the impact on the company's solvency position, embedded value and CAR cover if they allow for negative liabilities.**

This question was relatively well answered. It required candidates to explain the impact of allowing for negative liabilities. Many candidates missed the points relating to TCAR, tax and possible actions w.r.t having a larger surplus.

Liabilities will reduce with the recognition of the negative liabilities;

- resulting in an increase in the free surplus
- resulting in an increase in the CAR cover.

There will be an increase in the CAR as a result of the higher lapse CAR. This will reduce the CAR cover.

Company may go from OCAR to TCAR

The value of in force business will be lower as more of the profits will be released immediately with the recognition of the negative liabilities.

There will be a further impact (reduction) on the embedded value from the higher cost of CAR.

The tax will be higher in the shareholder fund from the higher transfers from the policyholder funds.

The negative liability will create an asset on the balance sheet.

The company will have to decide how to manage this, e.g. if they want to reinsure against the risk of lapses or use it to fund new business strain.

The increase in free surplus could provide

- other business opportunities
- more investment freedom.

(ii) Describe the further changes that the company will have to make to their valuation methods and assumptions in order to calculate their technical provisions under SAM regulations?

This question was largely bookwork, and relative to this, was again poorly answered by too many candidates. It required a high level overview of the valuation methodology under SAM. Better candidates managed to score very high marks while those who didn't know the material scored poorly. Again, a question which allowed the better candidates to easily differentiate themselves from the rest.

Technical provisions need to be calculated on a best estimate market consistent basis.

{looking for best estimate and market consistent}

All the assumptions are best estimate and discretionary margins will be ignored.

The company needs to determine what the appropriate contract boundaries are for their products.

There is not a definitive contract boundary for whole life products.

Future cash flows will be discounted using a market consistent yield curve (bond or swap yield curve).

There are no risk premiums above the risk free rates.

There may be an illiquidity premium for the valuation of annuity business.

Use a market consistent real yield curve to derive the expense inflation yield curve.

Need to calculate the risk margin on the technical provisions (non-hedgeable)

The risk margin is 6% of the projected SCR, discounted at the valuation rate.

There will be an iterative process in calculating the risk margin, because as the risk margin changes, the SCR changes.

QUESTION 3

- (i) **Describe the likely impacts of the interest / yield changes on the profitability of the DI business line in 2012.**

This was a practical question requiring candidates to make an assessment on profitability in a falling interest rate and generally poor economic environment. It was surprisingly poorly answered. The greatest impact would have been on the valuation of liabilities and there could have been possible impacts on actual policyholder and claimant behaviour too (higher inclination to claim or to not return to work). Many candidates spent too little (or no time) discussing the impact on the valuation of liabilities, the assets backing these, matching, real vs. nominal differences etc.

Liabilities linked to Disability Income (DI) business most likely to be matched by bonds.

Interest rates and bond yields have been falling during economic downturn. Inclusion of SA in world bond Index has also driven up demand for SA bonds, e.g. funds that track the index. Bond prices driven up and yields fall further.

Lower yields / interest rates imply higher liability for prospective reserves.

Group products are essentially one year term covers and as such no prospective life reserves. Reserves are limited to reserves such as IBNR and UPR.

Individual products could have a policy reserve, size of which depends on duration and premium pattern. Reserve could also be negative (and potentially be zeroed).

Disability claims in payment (CIP) are valued prospectively for both group and individual.

All reserves would increase with a drop in interest rates. CIP reserve (and changes) could be significant.

Extent of the increase depends on :

- How the reserves are calculated, yield curve or point estimate, and where the changes on the actual yield curve have been.
- For CIP specifically, whether there is a heavier weighting towards using a nominal interest rate (claims with no or little escalation in payment) or a real interest rate (claims with escalation in line with inflation) in the calculation of the reserve and the respective actual changes. i.e. has movement in one been more significant than the other.

Need to assess whether a change (or full extent of any change) is necessary

- do the changes in interest rates impact the company's view of best estimate long term interest rates currently in use.

- if a change is made to the interest rate assumption the company may also reconsider any second tier margins that may have existed. i.e. it may be able to absorb some of the change through reducing or eliminating this margin..

A change in interest rate would also impact the reserves held for expenses linked to the future administration and management of these policies and claims

Impact on profitability will depend on the extent to which increase in liabilities are offset by changes in value of the assets backing the liabilities.

This will depend on the extent to which the assets backing the CIP reserve are matched.

The company should also consider whether a change to any of the other valuation assumptions is required. There is some evidence of worsening disability experience during economic downturns.

- This could be due to a change in termination rates due to less people returning to work or having fewer possibilities to return to work during an economic downturn. Higher CIP reserve required.
- This could also be due to an increase in the number of claims as retrenchments and downsizing occur. For any business where premiums are guaranteed and this change can't be immediately reflected, losses are likely to occur and a potential deficiency reserve should be set up.

(ii) A potential partnership has been proposed whereby your company could utilise infrastructure to market and sell disability products in African countries. Discuss the factors that would need to be considered in assessing this proposal.

This question was well answered by most candidates. The better candidates managed to generate more points than the other candidates.

A full assessment of each market in terms of regulation, legislation etc. is not required due to the fact that the company only extending a product into a market where operations exist. The company would need to look into any regulation governing disability business specifically.

The company would need to consider the viability of a disability product in each of these markets though, both in terms of the need for the product and the size of the potential market.

The company should look at competitors and assess what they offer. Are other disability products offered and if so are they income or lump sum benefits.

If similar products are offered, how are they faring in terms of sales and profits.

If similar products are not offered, the company would need to consider the additional cost and risks of being the first entrant. The company may want to consider why the product isn't currently offered.

Offering a product that is unknown or new to the market would require additional effort and cost in terms of education and awareness of both sales channels and the public.

DI is a relatively expensive product compared to other risk products. It is also a complicated product in terms of claims triggers and definitions. The company would need to consider whether this is appropriate for the relevant markets.

Introducing a product which is misunderstood may introduce potential reputational risk.

Claims underwriting and management is critical for disability products, especially DI. How will this be handled in other countries?

- Would claims be assessed and managed from South Africa.
- The company would still need to rely on medical staff in each specific country for some assessment and management. How will the access to health facilities and health professionals impact the experience of the product in each country.

The company would need to decide whether to release a full or limited product range.

The company would need to consider an appropriate sales channel and whether any existing ones are appropriate.

The company would need to ensure the ability to administer the business correctly.

The company would need to consider the investment strategy required to match the liabilities in each country, are the assets available or would it match them with assets in SA?

Pricing is an issue, incidence rates and duration of disability are likely to vary from country to country.

A reinsurer that has experience in any of these markets may be able to assist.

- Other products in the market which have similar claims triggers could prove useful in assessing the potential cost such as any other disability products, health and medical products and even critical illness. (some of these unlikely to exist though)

(iii) Set out what stop loss cover is and describe how it could be used in this scenario as well as how you would go about determining an estimate for the cost of such cover.

This book work part of this question was answered well. Many candidates did miss (or didn't state) that SL is an aggregate cover and that there is a time period to it. Candidates also missed 2 of the major uses in limiting volatility and concentration risk.

The application part of the question wasn't as well answered. Most candidates stated that some sort of model would be required but couldn't explain the logic in actually needing a distribution of expected claims costs and how these could be turned into a theoretical SL cost. The better candidates could then also describe how a theoretical cost would be different to an actual reinsurance price.

Define :

SL is a non-proportional cover (Percentage of premiums paid to reinsurer does not equal the percentage of any claim paid in return)

It would pay out an aggregate amount being the total claims over a predefined period (usually a year) above a predetermined retention level (priority / attachment point)

The scheme's loss would be capped. Reinsurers maximum liability would however also be limited.

{terminology may differ here from candidate to candidate}

Use :

SL is used to reduce claim fluctuations, in this case in the aggregate.

SL would protect the insurer from higher than expected claims values as well as higher than expected numbers of claims over the period of cover.

SL would provide some solvency capital relief for the scheme covered.

SL would provide extra protection for concentration risk.

Cost:

A standard pricing model that is likely to have been used to price the scheme is only likely to include a deterministic expected cost of claims over the period of cover.

In order to assess the cost of SL cover you need a distribution of the expected claims costs in order to :

- assess the likelihood of the total cost being over the retention level (probability of claim);
- assess the size of the total cost once it does breach the retention level (expected size of claim).

In order to do this a full stochastic model can be used, mortality and cover amounts being stochastic variables.

A simpler monte-carlo model could also be used where the mortality assumptions and cover amounts are given and a simulation is run.

The output of the model would need to be compared to the standard pricing model.

- The expected cost from this model should be the same as that from the deterministic model.
- If it is not then the number of simulations needs to increase or the input assumptions checked.

You would also check the maximum and minimum costs given by the output, are these realistic? (Is it realistic to have a run where most people or no people claim etc.)

Depending on the complexity of the model, it is unlikely to include a cost for any catastrophic or tail risk and as such there must be awareness that there may be some unmodelled risk. This would require expertise from reinsurer to model.

You would also need to consider some function of volatility in the final premium.

Some schemes may have the same expected costs but have very different volatility profiles (standard deviations for example). Higher volatility implies a greater risk and this should be allowed for in price.

A reinsurers final cost is likely to be different to your estimated costs due to the fact that their expense and profit margins would also be added.

These are also unlikely to be standard expense and profit margins due to it being a tailored reinsurance structure and will have a different risk profile / profit requirement to regular treaty business.

END OF EXAMINERS' REPORT