EXAMINERS' REPORT

June 2019 examinations

Subject F103 — *General Insurance*
Fellowship Principles

INTRODUCTION

The attached report has been prepared by the subject's Principle Examiner. General comments are provided on the performance of candidates on each question. The solutions provided are an indication of the points sought by the examiners, and should not be taken as model solutions.

QUESTION 1

i. a. Profit commission is commission paid by a reinsurer to a cedant.
        The commission is dependent upon the profitability or claims experience
        of the total business ceded during each accounting period.

        This is most likely to be used for:
        - Proportional reinsurance (i.e. quota share and surplus); or
        - Low excess layers of XL reinsurance (i.e. working layers).

    b. Ceding commission is initial commission paid by a reinsurer to a cedant, likely to be
        as:
        - a contribution towards acquisition expenses;
        - compensation to the cedant for the extra work done in attracting and
          administering the business; and
        - in recognition of anticipated profit on the reinsurance contract.

        This is most likely to be used for proportional reinsurance.

ii. a. The largest EML which can be retained by the insurer is $4m
        The largest EML which will be accepted by the Surplus reinsurer is $7 \times \$4m = \$28m$
        Hence the largest EML which can be written by the insurer (allowing for the 20% QS)
        is ($4m + $28m)/0.8 = $40m
        As this is a Category 3 risk we can then conclude that the maximum Sum Insured which
        can be written is $40m/0.8 = $50m

    b. The maximum Quota Share recovery $= 0.2 \times \$50m = \$10m$

    c. For Category 3 risks the proportional cover is split as follows:
        QS: 20%
        Insurer: 80% / (1 + 7) = 10%
        Surplus: 80% $\times$ 7 / (1 + 7) = 70%
        Hence the maximum Surplus recovery on a $50m (Category 3) risk will be:
        = $50m $\times$ 0.7
        = $35m

    d. On a $5m (Category 1) claim the maximum net claim payable by the insurer will be:
        = $5m $\times$ 80% = $4m
        On a $20m (Category 2) claim:
        The EML will be $20m $\times$ 0.6 = $12m
        This will be split as:
        QS: 0.2 $\times$ $12m = $2.4m
        Insurer: $4m (maximum retention)
        Surplus: $12m – $2.4m – $4m = $5.6m
        This would result in a net claim for the insurer:
        = $20m $\times$ 4/12 = $6.667m

On a \$50m (Category 3) claim the maximum net claim payable by the insurer will be:
$$= \$50m \times 10\% = \$5m$$
Thus the maximum net claim will be \$6.667m

This question was answered fairly well by the better prepared candidates. On the whole answers were set out fairly well, with clear explanations. Some candidates lost marks, however, for inadequate explanations, and for omissions of currency/units.

QUESTION 2

i. Main factors to consider:

- Global strategic objectives: If the reinsurance company is part of a global company, does expanding into property and casualty lines of business fit into the global strategy?
- Business objectives: is the aim to increase premium growth, increase market share, obtain synergies between life and P&C lines of business?
- Brand: moving into the new market may have an impact on the brand of the company and managing this process will also be important.
- Regulator licenses: Is there a requirement to obtain a new license to sell reinsurance within the P&C space and how easy is it to get a license?
- Competitive Pressures: How much of the P&C market is already being reinsured and by which reinsurers? Will you need to compete on price, technical expertise or will relationships and services offered be more important?
- Market conditions: What is the current stage of the insurance cycle and what are the current economic and political conditions within the country?
- Difficulty in establishing the technical price: Do you have enough data and experience in order to price the new business?
- Market Acceptability: Will insurers accept the expansion and what will the impact be on the current book of business?
- Profit optimisation: Will there be a trade-off between profit optimisation and growth until the reinsurance company is more established?
- Capital to support new business: Writing new business will require new capital and resources. Is this freely available and what will the impact be on the SCR of the company?
- Impact of retrocession capacity: Would the reinsurance company be able to retrocede some or all of the new business until they are more established within the P&C space?
- Sophistication of data systems to handle new business.
- Regulation restrictions: are there any restrictions that the CEO needs to be aware of?
- Relationships with current clients and chances of obtaining new business: Can the reinsurer leverage existing clients to take over some of their non-life business?
- Ability to provide support in terms of servicing clients with underwriting, claims and technical expertise.

- Global support: Can the reinsurer tap into other reinsurers on a global scale to make the transition easier.

ii. Data considerations:

- To price policies appropriately the company needs reliable and relevant data.
- Given that the company currently does not have any policy or claims data within the current market, it will need to consider external data sources or adjust data from other branches based on similar markets if this is available.
- It could conduct research into what information is currently requested by the direct writers to identify what rating factors each company uses. This would provide some insight into how the current market operates.
- It could investigate any market claims data or publicly available information to determine if this will help. This could be in the form of aggregated market statistics or data requested from brokers.
- If competitors' rates are available, this would be invaluable, but this is not always available.
- The reinsurer can also look at internal data from branches around the world and see whether they have appropriate pricing models and data which could be used.
- The reinsurer could also look at putting in place some retrocession agreements and based on the quotes for this identify how it could use this information to price the new business.

Part (i) was generally reasonably well answered. However, most candidates provided too few points to score highly on the question.

In part (ii) a number of candidates made the mistake of providing too much detail on specific points or focused on the data system or pricing methodology rather than data requirements. Another common mistake was to talk about data requirements in general, without accounting for the fact that the reinsurer only writes life business and therefore would not have any internal data.

QUESTION 3

i. A typical reserving process would include the following functions, each of which can include some form of automation:

- Data processing and transformations
- Data cleaning and reconciliation
- Method selection
- Assumption setting
- Validation of results
- Reporting

Examples of possible automations include:

- Data processing – Company reserving processes may include manual extraction of data from a system into the required format (such as run-off triangles) as needed for a reserving exercise. This can be improved through running a programming script to extract and transform data.
- Data cleaning – Company data systems can include distortions from errors captured by claims handlers. Automated checks can be implemented to identify distortions which could include identifying movements greater than a threshold or "link ratios" greater than a given percentage from the mean.
- Method selection – e.g. there could be automated checks built into the process to identify whether the current settlement rates underlying the paid chain ladder remained constant over the investigation period. If not, then another method should be used or adjustments will be required to the raw development.
- Assumption setting – an automated report showing average costs per month, can provide insight into inflation assumptions used in projections of future IBNR.
- Validation of Results – automated dashboards could include a report that highlights where the actual experience was different to expected from the previous valuation by more than a given percentage for a given class or year cohort.
- Reporting – The team should ensure that automated links to a report template is set up (if using spreadsheets) rather than manual data entry.

ii. There are a number of diagnostic tests available to validate the results, including:

- Actual vs Expected Analysis – Monitoring the actual claims development against that expected over the quarter (or projection period) or since previous reporting date.
  - The actuary can set up an actual versus expected investigation analysis based on numbers of claims reported, number of claims settled, amount of claims paid and movements in case estimates over the development period.
  - Where the actual experience during the quarter is very different to that expected for either numbers or amounts of claims, say outside a pre-defined threshold, the actuary can then start further investigations.
- Movement Analysis – Set up a process to identify distortions, such as large movements, which may include:
  - Monitoring and identifying total claims movements in a given class or year cohort against a pre-defined threshold, (such as the 65th percentile or one standard deviation).
  - Identifying individual large claims movements

The investigations may show that the projection assumptions need to be refined or can assist in identifying distortions or large random fluctuations in the claims experience.

Candidates generally performed well on part (i). Part (ii) was generally poorly answered. Most candidates did not describe the tests in sufficient detail to score well.

QUESTION 4

i.   Liability characteristics:

- The starting point is to determine the liabilities' characteristics:
  - ➢ Commercial property claims are for the cost to rebuild and reinstate a property, and are therefore subject to labour and materials inflation, hence are real in nature.
  - ➢ Claims inflation is likely to be higher than CPI inflation.
  - ➢ Commercial contents cover is usually for indemnity i.e. the depreciated value of contents – depreciation might offset inflation so difficult to establish the nature of contents, however this is often smaller than building repair costs.
  - ➢ There is usually little notification delay – the event often occurs suddenly, the cause is easily determinable, and claim amounts are easily estimated.
  - ➢ Settlement is usually short-tailed but can take longer for larger claims and entails intermediate payments as building repair proceeds.
  - ➢ Settlement for stock loss can be delayed where necessary to verify the value of stock lost.
  - ➢ Currency: Local currency (as it is a local insurer).
  - ➢ Variability: Owing to the large variability of properties, claim sizes can have a scattered distribution.

Asset characteristics and suitability of the assets for the liabilities:

- Fixed assets (direct property and artwork) returns should be:
  - ➢ Inflation-linked (hence the nature matches the liabilities).
  - ➢ The real nature of these assets could provide a good match for shareholder funds (and forms a substantial part of these).
  - ➢ As the property is very illiquid and occupied by the insurer it is not suitable for outstanding claims reserves.
  - ➢ The artwork is less illiquid, however prices are very dependent on the economy and could be depressed in a recession, hence not suitable for matching outstanding claims reserves.
- Fixed interest:
  - ➢ Returns are fixed in nature, and therefore not suitable for longer-term real liabilities, however might be suitable for shorter real liabilities (as it's unlikely that inflation would differ much from expected).
  - ➢ Difficult to comment on suitability of the term- if most assets are close to 5yr then this may be too long for the liabilities.
  - ➢ Liquidity is likely to be good, and suitable for outstanding claims.
- Cash:
  - ➢ Best liquidity of all assets, and hence suitable to match short-term obligations and working capital.
  - ➢ Returns should be approximately similar to inflation, providing a suitable match for the liabilities.
  - ➢ The amount of cash appears to be low (less than 1 month premiums).

- Agent balances and current assets:
    - ➢ Provided these are received by the insurer in the short-term, this source of liquidity can be used to supplement cash reserves.

Overall:

- The solvency level is 24% - while this may be low for a small insurer, more information is needed on reinsurances in place, risk exposures, regulatory solvency levels and risk-based capital requirements.
- Assets do not appear to be mismatched to any great extent, however possible items for review include:
    - ➢ Investment in artwork could rather be invested in more liquid real assets e.g. shares or cash.
    - ➢ Cash appears to be low should there be a large claim or accumulation of claims.

ii. A sidecar:

- Is a financial structure created to allow investors to take on the risk of a group of insurance policies.
- It is a means of allowing investors exposure to the reinsurance market without having to invest in existing reinsurance companies, which may have losses from previous years.
- A sidecar acts like a reinsurance company but it reinsures only one cedant.
- Investors need to place sufficient funds in the entity to ensure that it can meet any claims that arise.

iii. Director's suggestion:

- The director is correct in that:
    - ➢ Returns offered by sidecars need to be higher than risk-free to compensate investors for higher risk.
    - ➢ The returns enjoyed by investors in sidecars are unlikely to be correlated to returns from other market assets – poor returns will materialise due to higher claims experience rather than depressed investment markets.
- The above benefits that apply to non-insurance investors may be overshadowed by the following disadvantages to the insurer:
    - ➢ The diversification benefit may be diluted if the claims experience from the policies underlying the sidecar is correlated to commercial property insurance experience.
    - ➢ In the worst case sidecar experience may be so highly correlated with the insurer's claims experience that the investment creates accumulation risk for the insurer.
    - ➢ If the investment performs poorly at the same time that the insurer's claims experience deteriorates this will strain the solvency position.
    - ➢ Risk-based capital requirements will be higher for the insurer due to investment performance being correlated to claims experience.

> ➤ A sidecar investment is unlikely to be as liquid as government fixed interest stocks –if the insurer is suddenly faced with large claims it may need to realise many of its assets as quickly as possible.
- The appeal of the sidecar is therefore very dependent on the insurer issuing it and the policies underlying the vehicle.
- It may not be possible to find a sidecar of suitable term that matches the insurer's liabilities.
- The nature of the returns from the sidecar are unlikely to match inflation affecting commercial property claim liabilities.
- Investment expenses are likely to be higher than for government fixed interest.
- Investment in a sidecar offered by another insurer could be considered as accepting reinsurance business rather than an investment decision.

Overall this question was reasonably well answered.

It part (i) it was concerning to see that some candidates were not clear on the distinction between contract term and the liability term. Many candidates made unjustified assumptions (e.g. about the distribution of fixed-interest bond terms), about asset classes backing free reserves and about the adequacy of free reserves.

In part (ii) most candidates obtained at least some credit for the definition of a side car.

Part (iii), which required some application and thought, was answered less well. Most candidates made the point of increased diversification, but far fewer realised that this in fact depends on the policies underlying the sidecar. Answers in general lacked depth.

QUESTION 5

i. a. Reporting year cohorts:

- OCR (reserve for outstanding reported claims).
- IBNER.
- Reserve for claims handling expenses.
- Reserve for reopened claims.

b. Accident year cohorts:

- OCR (reserve for outstanding reported claims).
- IBNER and "pure" IBNR.
- Reserve for reopened claims.

c. Underwriting year cohorts:

- OCR (reserve for outstanding reported claims).
- IBNER and "pure" IBNR.
- Reserve for reopened claims.

- Reserves relating to the unexpired risk as at 31 December 2018.
- Reserve for claims handling expenses.

ii. IBNER and its impact on the case estimates when using the BCL:

- The abbreviation is sometimes stated as "incurred but not enough reserved". It is a reserve reflecting expected changes (increases and decreases) in estimates for reported claims only (that is, excluding any "true" or "pure" IBNR claims).
- The BCL estimates a best estimate reserve. When case estimates are prudent the IBNER will reduce the claims reserves i.e. it will be negative by adjusting the case estimates downwards to a best estimate level.

iii. Calculate the incremental claims development factors and allow for the tail factor:

Incremental development factors	1-2	2-3	3-4	Tail Factor
	1.912	1.341	1.230	1.100

Calculate the cumulative development factors:

Cumulative development factors	1 - ultimate	2- ultimate	3-ultimate	4-ultimate
	3.469	1.814	1.353	1.100

Calculate the best estimate case estimates and compare to the booked figures:

Year reported	Cumulative paid claims	Case estimates (best estimate)	Case estimates (booked)	Sufficiency of case estimates
2015	2,784	278	658	136%
2016	2,716	959	1,324	38%
2017	2,283	1,858	1,908	3%
2018	1,143	2,821	2,978	6%
Total	8,925	5,917	6,868	16%

The case estimates in the financial accounts are sufficient and are 16% higher than a best estimate reserve.

iv. Additional investigations:

- Discussions with claims team. The claims team might provide information on the level of prudence in the case estimates and whether these are sufficient.
- A "pure" IBNR could be estimated by using the Average Cost Per Claim method. The "pure" IBNR would then be subtracted from the IBNR to determine the IBNER.
- Perform diagnostic tests by calculating key ratios and analysing historical trends. This could include:
  - ➢ Case estimates/IBNR
  - ➢ Case estimates/earned premium

© Actuarial Society of South Africa

- Compare initial case estimates against the final settled amount. If the initial case estimate is greater than the final settled claim amount this likely indicates that case estimates are adequate.
- Calculate the IBNER using reported claims triangles based on incurred claims in addition to using paid claims. IBNER Estimates can then be compared to the IBNER calculated based on paid claims and any differences understood.

v.   Comments:

- The IBNR calculated using the BCL, based on accident year or underwriting year cohorts, includes the "pure" IBNR plus the IBNER. Thus it is true that any over/under estimation of the case estimates will be corrected by the IBNER component implicit in the IBNR. Should reporting year cohorts be used then only an IBNER will be estimated, and thus an IBNR will need to be calculated separately.
- However, the IBNER may need to be calculated separately to assess the consistency of the case estimates over time. This needs to be taken into account when selecting the claims development factors applied under the BCL, which assumes consistency in the setting of case estimates.
- If the "pure" IBNR is assumed to be nil, for example for large or catastrophic claims, then an explicit calculation of the IBNER may be required.
- The IBNER may also be required separately for internal management purposes.
- Legislation may require that the IBNER is calculated separately.

In part (i) candidates generally performed quite well. However, a number of candidates did not appreciate that reporting year and accident year cohorts only project the cost of claims incurred prior to the valuation date, compared to underwriting year cohorts which, in addition, project the cost of claims incurred after the valuation date for the remaining unexpired risks.

It was disturbing in part (ii) that many candidates did not know the full definition of the IBNER. A number of candidates stated that an IBNER is only needed if case estimates are insufficient, and thus that prudent case estimates would result in a low IBNER. This is not correct as an IBNER can be positive or negative, and so prudent case estimates will result in a negative IBNER when reserving on a best estimate basis.

Part (iii) discriminated well between the candidates who understood the difference in the claim reserve components calculated by applying the BCL to accident year versus reporting year cohorts, and understood the definition of IBNER and those who did not.

Candidates generally did not perform well on part (iv). The candidates who performed best were those who were able to apply the principles of using diagnostic tests provided in the notes to determine the sufficiency of case estimates.

QUESTION 6

i. Moral hazard:

  - The risk that an insured may behave in a less risk averse manner when they are insured, and hence not subject to the full financial consequences of their actions.
  - E.g. leaving their house unlocked when they go out.
  - While this is undesirable for the insurer, it is legal.

   Fraud:

  - This is when the policyholder is dishonest and, illegally, goes against the insurance contract.
  - E.g. claiming for an injury under a personal accident policy which did not take place.

ii. Examples of fraud:

  - Motor: a policyholder, with third-party, fire and theft cover (motor insurance excluding accident cover), suffers non-claimable damage to the insured vehicle. The policyholder then drives the vehicle to a remote spot, destroys it by fire and claims under the fire section of the policy.
  - Household contents: claims are made for loss of fictitious articles, or the values are exaggerated.
  - Buildings: claims are made for defective roofs, which are really due to natural wear and tear.
  - Buildings: after a genuine insured loss, a builder may offer to add the amount of the insurance excess to his invoice. The insurer then unwittingly pays the full amount of the actual repair cost.

iii. Increases in fraud may have been due to:

  - A dip in economic activity. Generally during a recession, insurance fraud increases as policyholders become more desperate for money.
  - A relaxing of claims assessment levels. The company may have been trying to save costs by not being as thorough in assessing claims. This would result in more fraudulent claims slipping through.
  - A change in product design. For example, changing from insuring depreciated value to replacement would have made claiming very attractive as policyholders would stand to gain from claiming, rather than being put back in their original position.
  - A change in societal attitude towards fraud. People in general may have changed their attitudes to insurance fraud. For example, if people started believing that

insurers were making large profits and could not be trusted, it may result in fraud becoming more acceptable among circles of friends, so people would be more likely to commit fraud.

iv. Updating premiums to allow for fraud:

- Claims fraud would increase the frequency of claims, where the entire claim submission is fraudulent. Thus, the claims frequency would need to be updated.
- It would also increase the severity of certain valid claims, where the claim amount is exaggerated, for example. Thus the frequency distribution would be shifted to the right.
- The uncertainty relating to claim amount would also increase as the total level of fraud is unknown (otherwise fraudsters would always be caught), so the volatility of the frequency and severity distributions would need to be increased.
- The greater uncertainty in the overall cost would mean that a greater uncertainty margin would need to be added to the premium.
- The increased premium would likely result in a reduced overall volume of business being sold. Thus a higher expense loading needs to be applied to the premium in order to recoup fixed expenses and be profitable.
- The extent of any changes would depend on the extent to which fraudulent claims are already incorporated in the past data and current rates.

In part (i) most candidates displayed a good grasp of the concepts of morale hazard and fraud.

Part (ii) was generally well answered with good examples. The most common mistake was to explain a fraudulent act, but not make it clear how the policyholder would gain.

In part (iii) most candidates generated good ideas. A common mistake was to state why fraud may be present at a given point in time, rather than making it clear why fraud would be increasing as was the case in the scenario.

In part (iv) the better candidates broke the question down into the effects that fraudulent claims may have on frequency, severity and uncertainty in general. Some candidates gave narrow answers, focussing on one aspect only, for example adding a contingency margin. A common mistake was for candidates to believe that there would be lots of data available on fraudulent claims, when in reality fraudulent claims are rare or go undetected.

QUESTION 7

i. Perils:

- Mortgage indemnity guarantee insurance covers the bank against the peril of the borrower defaulting on their loan.
- This may be caused by a number of things, including retrenchment.
- The perils leading to default are not specified under credit insurance, so non-payment for any reason is covered.

Benefits provided:

- The benefit is the amount of the outstanding loan the bank is unable to recover by selling the house.
- Claim payments are usually single lump sums.

ii. Potential risks:

- Interest rates may be high for an extended period, resulting in greater levels of defaults on loans and higher outstanding loan amounts.
- A recession or period of low economic activity will result in more defaults on loans and likely lower house sale prices, both increasing the potential claims.
- Falling house prices, resulting in larger claim amounts in the event of default. This may be due to reduced demand or increased supply.
- Reduced numbers of house sales may result in a reduced need for mortgages and hence insurance. Thus, reducing the insurer's ability to spread fixed expenses and make profits.

iii. Modelling mortgage indemnity guarantee business:

- The key driver of claims on this class will be related to the state of the economy. It is thus essential that the insurer collects data relating to economic variables and house sales prices.
- The company may be able to purchase the output of an economic scenario generator if it does not have the expertise to build such a model in-house.
- When modelling claims, it should split claims into frequency and severity.
  - Frequency of claims will increase (increased likelihood of default) in the following situations:
    - Increasing interest rates, increasing the interest burden and size of loan repayments.
    - Increased unemployment/reduced economic activity, reducing the income of policyholders and their ability to repay their loans.
  - Severity of claims will be higher when:
    - Loan amounts are higher – this will be the case when:
      - Loans are earlier in their term, so have had little time to reduce.
      - Interest rates have been higher, so loans have been reducing more slowly over time.
    - Property sale values are lower – this may be the case when:
      - More people are selling, hence increasing supply and lowering prices (a buyers' market).
      - There is lower demand for property.
      - Both of the above may apply during instability following elections.
      - House prices will also be lower when being sold under distressed conditions e.g. auction, so the bank will likely get less than the normal market value.

- The insurer should ensure that assumptions made for the above reflect the unique characteristics of their policyholders.
  - For example, type of area that houses are in and likelihood of a drop in value; and the terms outstanding on the loans and current loan values.
- Any assumptions in other classes already in the model should be consistent with the economic scenarios used for modelling mortgage indemnity guarantee claims.
  - For example, in a recession, fraudulent claims are likely to be higher on other classes.
  - This will ensure that the capital level is not artificially low, due to high correlations in extreme scenarios.
- The actual claims can be calculated as the frequency multiplied by average severity in the economic scenario simulated. Alternatively, if the data are available, a potential loss can be calculated on each mortgage insured, with the probability of claim on that mortgage equal to the frequency calculated based on the economic conditions.

iv. Key points in response to regulator:

- Overall, based on the risks mentioned earlier, it is likely that political instability will result in increased mortgage indemnity guarantee claims.
- However, that does not necessarily mean that more capital must be held.
- The capital held is protection for extreme events, of which political instability may be an example.
- Just because things may be higher than average, it does not imply that the expectation of the extreme scenario has changed.

Part (i) was mostly well answered. Some candidates, however, confused credit insurance for mortgage indemnity guarantee insurance.

In part (ii) most candidates identified relevant risks, though a common shortcoming was to not outline the points in enough detail. For example, when stating that interest rate increases would lead to more defaults, many candidates failed to suggest what might cause interest rates to increase.

Par (iii) was extremely poorly answered by the majority of candidates, with very little or no attempt to focus on the product in question and outline key steps and assumptions as asked. Many candidates simply regurgitated the theory on steps in modelling the capital requirement. This approach was not awarded much credit.

In part (iv) a number of candidates applied their minds well to the question. Poorer candidates simply agreed that an increase in capital was necessary.

END OF EXAMINERS' REPORT