

EXAMINERS' REPORT

May 2023 examinations

Subject F203 — *General Insurance* **Fellowship Applications**

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.

The SA3 exam is designed to test “higher order” thinking including candidates' ability to apply their knowledge to the facts presented in detail, synthesise and analyse their findings, and present conclusions or advice. **Successful candidates concentrate on answering the questions asked rather than repeating their knowledge without application.**

The intention of the report is to be used as a study guide. Students should therefore note that this is considered a model answer and contains far more than the 100 marks shown for the exam.

Topical nature of the exam:

Question 1 sets the scenario for you being an actuary employed by a large multinational insurer who aims to sell a catastrophe coverage product similar to the mechanics of SASRIA. SASRIA had a lot of news time with the KZN riots causing the insolvency of the company.

Question 2 considers the mechanics of a captive insurer. Eskom was recently in the news for declaring dividends when not all of the considerations for such a declaration were adhered to.

Question 3 aimed to be a professionalism type question asking about the roles and responsibilities of the Head of the Actuarial function. Following the recent insolvency of a local insurer.

Students thus taking any interest in the above topics would have scored well in the exam.

High Level observations:

The paper contained a lot of bookwork and therefore the marking focused on the student's answers given the topic of the question. In a lot of cases, you could pick up students knew the words applicable to the question but did not really grasp the concept / did not explain this at all.

- Questions asked were not considered difficult at all – this was a comment throughout the exam setting process.
- The exam contained generous amount of bookwork with application of the bookwork following the question. The bookwork tested in this exam is not considered difficult or abstract, yet some students still struggle to answer the questions.
- The pass mark for the exam was in line with prior papers.
- There is a fundamental difference between answering a F100 level paper and answering a fellowship paper. The fellowship paper focusses on commercial acumen and applying your knowledge to the question – from the scripts received most students do not appreciate this when answering the paper.
- A number of students still answer questions by putting down points that make no sense on a stand-alone basis. For example:
 - Allow for trends
 - Reinsurance
 - Allow for tax
 - Allow for VAT
 - Claims made basis

The above is not only generic – but also open ended. For example: which trends should the marker allow for? What does the student mean when writing *Reinsurance*? Which portion of the VAT/Tax act is the student referring to here – what about the product/circumstances etc....

No point should be made leaving the marker with a so what/in what way... marks are not awarded for these statements.

QUESTION 1

(i)

Students missed a lot of points on the advantages and disadvantages by making irrelevant points. Better candidates understood the advantages of no longer having to guess reinstatement premium and how the structure essentially mimics that of SASRIA which was given. Better candidates considered whether there would still be default events – since LargeCo is not government backed.

Advantages (LargeCo)

- By focusing exclusively on catastrophic events, such as natural disasters or terrorist attacks, the insurer can become very knowledgeable about the specific risks associated with those events and the best ways to mitigate them
- This expertise can lead to more accurate pricing of policies and better risk management practices, which can ultimately result in improved profitability for the insurer.
- The fact that the past year's catastrophe cost can be tracked in the price, gives some price "certainty" to insurers and the local markets.
- Catastrophe risks in isolation do not contribute to the systemic risks of the broader financial system. Therefore, the product diversifies the insurance business by only being exposed to catastrophe events. LargeCo already has a significant property portfolio, adding this portfolio will diversify the portfolio by then adding to the mix of risks within the portfolio
- May allow rapid profit recognition if there are no declared CATs, particularly if there are time limitations on how soon a CAT declaration has to be made
- Given the distribution abilities of the insurer - the product should be able to generate additional revenue for the insurer due to essentially acting as a reinsurance contract across many countries.
- The ease of administration could make this a favourable policy from an administration perspective.
- With the increase in data received, LargeCo can allocate its resources more efficiently and optimize its capital structure to support its business strategy.

Disadvantages (LargeCo)

- High volatility: Catastrophe policies are subject to high levels of volatility due to the unpredictable nature of catastrophic events. If a large event occurs, it can result in significant losses for the insurer - this would have to be tested together with the existing portfolio
- Catastrophe policies represent a relatively small segment of the insurance market, which means that insurers who specialize in this area may face limited growth opportunities.
- This can make it challenging for the insurer to generate sustainable profits and build a stable business over the long-term.

- High regulatory scrutiny: Catastrophe policies are subject to high levels of regulatory scrutiny, as they are often seen as critical to ensuring the stability of the insurance market. This can make it challenging for insurers to operate in this area and may result in additional compliance costs.
- Essentially you are outsourcing many functions to local insurers - LargeCo will need to ensure they have sufficient processes in place to fulfil catastrophe claims should they occur. If the company suffers claim leakage - then so will LargeCo
- Risk of anti-selection from certain catastrophe prone areas - if only countries/areas within countries that are more prone to catastrophes (e.g. California earthquakes) are interested in buying this product? (Can be priced though)
- Additional credit risk if the local insurers do not pay over the premiums.
- *May be subject to high capital costs relative to the premium written.*

(ii)

Advantages (Local Insurers)

- Catastrophe event incurred claims now essentially now outsourced.
- Could increase pricing accuracy - and ensure more stable outcomes.
- Will reduce the capital requirements - if approved in the regulatory standard formula
- Easier than guessing the number of reinstatements required for the number of events that will take place per year.
- Could show the insurers commitment to world-wide climate change sustainability. (Essentially the product aims to cover worldwide catastrophes and by participating in the world-wide effort - your policyholders are participating in the sustainability and solution)
- May improve availability and competitiveness in the local catastrophe cover markets.
- Provides for more complete risk transfer.

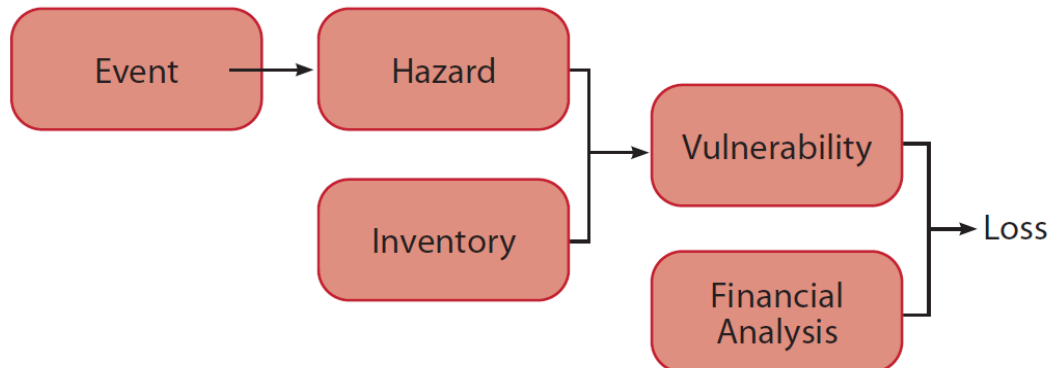
Disadvantages (Local Insurers)

- Could become expensive cover after a few years of bad catastrophic experience. This is both the local country catastrophe experience as well as the word wide catastrophe experience.
 - Although unlikely to be much more than reinsurance cost following a significantly bad year
- Understanding the counterparty default risk of LargeCo - this could hinder the capital saving - and hence lead to lower ROE compared to traditional reinsurance cover. Essentially the product is not government backed – compared to SASRIA.
- Your outlook on Worldwide Catastrophes might be much more favourable than that of LargeCo and so you will not participate in the risk/return benefit on catastrophe cover.

(iii)

Bookwork from the notes. Better students used this the structure of the CAT model in the following questions to discuss why this could be used in-house specifically the advantages and disadvantages of using the RI broker.

- A catastrophe model consists of 5 basic modules, the collection of these being used to estimate the total ultimate loss from catastrophes.



- The model then uses the Vulnerability Module Financial analysis module to analyse the catastrophic impact.
- Of these modules, two (the inventory and financial analysis modules) rely primarily on data input by the user (an insurer or reinsurer) of the models. The data will be specific to the user.
- The other three modules represent the engine of the catastrophe model. The event and hazard modules are based on seismological and meteorological assessment and the vulnerability module on engineering assessment.
- **Event module**
 - A database of stochastic events (the event set) with each event defined by its physical parameters, location and annual probability / frequency of occurrence.
 - The event module will typically have many thousands of these possible events built up from scientific data, even though there may be only a few hundred events or even less in historical records.
 - The model may also contain a historical event set, allowing the user to model their current portfolio for specific past events, e.g. the 2022 KZN floods, the 2021 Table Mountain fires.

- **Hazard module**
 - This module determines the hazard of each event at each location. The hazard is the consequence of the event that causes damage. This module relates to the cause of damage from the catastrophic event, i.e. that which actually causes physical damage when the catastrophic events occurs
 - It will contain data measures describing the hazard related to each event. These are statistical measure which could be used to predict the damage cause by the hazard, such as maximum wind-speed, total storm radius, etc
 - For example, in the case of a hurricane, wind speed is the primary cause of damage; for an earthquake, it is ground shaking.
 - For an earthquake, the hazard would for example be ground shaking
 - For a windstorm, the hazard would for example be wind
 - So this module will specify, for example, that if a storm happens again, then it is likely to result in some wind damage, some floods, etc.

- **Inventory (or exposure) module:**
 - A detailed exposure database of the insured systems and structures.
 - As well as location this will include further details such as age, occupancy, construction, and number of storeys.
 - The model may also allow the user to put in more detailed information about a structure, such as information on roof anchors in hurricane models, or the presence of soft storeys in earthquake models.
 - This will be detailed data which could be used to determine the total exposure and vulnerability to catastrophes.
 - The inventory module contains the values of the buildings and contents that are to be insured. It is important to distinguish between these values and the insured limits.
 - One of the distinguishing features of Hurricane Katrina was that a high proportion of damaged buildings had been insured for significantly less than their full value without the knowledge of the insurers. Some estimates for the impact of this underinsurance were higher than 30% of total property values.

- **Vulnerability module**
 - Vulnerability can be defined as the degree of loss to a particular system or structure resulting from exposure to a given (level of) hazard (often expressed as a percentage of sum insured).
 - The vulnerability module produces the modelled loss based on the values of the buildings and contents that are to be insured, not the actual insured limits. It also models the loss arising from loss of use or business interruption arising from physical damage at the insured location.
 - These modelled losses are described as “ground-up losses“. This module specifies how much damage each insured item (e.g. property) is likely to sustain given a certain peril.

- For example, a detached house on a flood plain will be more vulnerable to flood than a third-floor flat.
- **Financial analysis module**
 - Uses a database of policy conditions (limits, excess, sublimit, coverage terms, and so on) to translate the total ground-up loss into a gross insured loss.
 - This module may also apply various types of reinsurance purchased to protect the portfolio. Typically, any facultative, risk excess of loss or proportional cover that inures to the benefit of the catastrophe excess of loss reinsurance is applied first, and then the catastrophe excess of loss is applied separately.

Thus, the user may be able to view the modelled losses from each of the following perspectives:

- From ground up gross of all reinsurance
- net of facultative, risk excess of loss and proportional reinsurance
- the catastrophe excess of loss reinsurance

(iv)

Your thinking here should be profit. i.e. premium – claims – expenses (Income statement) thinking. Many students only went on and explained inflation and claims – which is covered mostly by the CAT model outputs.

Premium assumptions

- Each participating insurer would provide you with an expectation of premium written for classes that could be affected by catastrophe.
- This would be required separately for Personal & Commercial Cover.
- Split further by region within country, i.e. CRESTA Zone
- If more granular information is available, i.e. longitude and latitude coordinates this will yield more information and could be integrated with the cat model outputs to determine different return period events.

Further assumptions that will need to be made:

- Insurer take up rates – Insurers will have a choice between reinsurers and this cover provided
- Cost of reinsurance cover - Retrocession type cover and the costs thereof
- Regulatory differences in each of the countries
- Inflation indices in each of the countries.
 - Susceptibility to demand surge inflation varies by country.
- Exchange related risks -Currency conversion risk
- Claims handling cost differentiation between insurers or the local Insurer's claims management efficiency

- Macro-economic circumstances in each of the countries, some countries might be heading to a recession which could severely affect the take-up rates

(v)

- This will allow the RI broker to have full understanding of the firm's catastrophe exposure
- The reinsurance broker will have knowledge of the available catastrophe models available in the market, being able to identify the strengths and weaknesses of all models available.
- There is no single model that is best to cover all risks and the RI broker is able to use their experience to either use certain models for certain perils or use other vendors models to validate output or check sensitivity of the results
- The RI broker will also use the most appropriate loss curves for the given project, either Occurrence Exceedance Probability curves which is used mostly for evaluating per event reinsurance, or Annual Aggregate Exceedance Probability curves which will tend to be used for reserving/capital projections
- The RI broker would require policy data in respect of locations of business, normally at postcode level although it may be aggregated to CRESTA level for some purposes
- The insurer would also have to supply the physical characteristics of buildings such as construction type, occupancy, number of employees, etc.
- And the financial terms of the policies, coverage value, limits, deductibles
- The RI broker will need to construct rigorous analysis of the insurer's exposure
- Their independence from the firm may also allow them to address nuances of their exposures which the firm is too close to recognise.
- The broker can also use wider market trends in use of such models to help the insurer's catastrophe risk management
- The service may be free alongside reinsurance brokerage
- Gives access to additional expertise

(vi)

Relatively well answered – although many students made the point that the costs would be prohibitive. This is an insurance company thinking of offering worldwide catastrophe cover – the R1m spent on cat modelling is unlikely to be a massive consideration.

Advantages

- Allows control of modelling to be in-house
- Allows management to understand more fully the processes involved in the modelling.
- Allows more detailed validation to be completed.
- Direct line of communication with the proprietary modelling firms who will have the most knowledge of the models themselves.
- Should be able to evaluate Reinsurance pricing easier.

- Can run the catastrophe module at firm's frequency.
- Less reliance on external party

LargeCo is a large insurer and therefore unlikely that the cost implications of internal CAT modelling will be prohibitive. Also costs will be offset from saving vs having an internal department doing the modelling.

Disadvantage

- You will not necessarily have the skill set in-house currently and may have to acquire such skills at a cost
- You will have to license different proprietary models and understand the outputs from each.. Even though this is not a large cost, if the take-up of the product is not achieved, this together with the additional staff above will cause the viability of the product to suffer.
- You will need to store the relevant data required for the modelled in their defined formats which may differ from how the data are currently used.
- Output from the model will need to be interpreted internally and will need the relevant skills.
 - Will be time consuming to build and maintain the models.
- Will now have more reliance on the proprietary model providers.

(vii)

Reinsurance structuring question. Many students again took a very generic approach mentioning all types of reinsurance which was not the question. Better students gave good reasoning for why a particular reinsurance structure would be available and why LargeCo would consider this structure.

To structure a Surplus treaty around this product would take some explaining... Especially on what you consider an EML / Sum Insured per country / per insurer and how you would determine layers.

- **Quota share arrangement**
 - Shares the risk proportionally between LargeCo and reinsurers.
 - LargeCo has large capital reserves - **therefore unlikely** to make use of Quota Share arrangements.
 - QS Will limit the impact of volatility in performance on the rest of the company.
 - Having a QS in place - could better the terms for the other reinsurance programs, i.e. should an Excess of Loss (XL) be placed on top of a QS program, LargeCo will likely get better terms for the XL.

- **Excess of Loss cover**
 - Generally, covers single large losses. *So in this context you would need to explain what you define as a single large loss – i.e. catastrophe from one country being 1 loss.*
 - For large claims coming from one country / one insurer could be considered (if one insurer was particularly exposed to a natural catastrophe in one are)
 - Could better the coverage terms on the aggregate XoL book - i.e. more exposure and experience could better the terms of the existing coverage.
- **Aggregate XoL / Cat XL:**
 - to protect against aggregate losses from the portfolio
 - Most likely cover in that all the policies that the insurer sells could be affected.
- **Stop Loss Reinsurance:**
 - to protect against poor performance from either attritional or large losses.
 - Likely to be very expensive / unavailable.

Surplus cover only marked – if you could explain that different countries / different insurers have different EML's / Sum Insureds. No one did this.

Facultative cover not marked at all. Question stated Treaty.

(viii)

Bookwork question. The application part of why this would affect LargeCo in different areas was only mentioned by a few.

- Demand surge inflation is a type of inflation that occurs when there is a sudden increase in demand for goods or services, leading to an increase in prices.
- This can occur due to a variety of factors, such as a sudden increase in consumer spending, a surge in demand for certain goods
- LargeCo would be interested in the process of natural disasters causing supply chain disruptions
- So by their nature the sort of events that trigger this product may hit thresholds that lead to particularly high demand surge, e.g. can't even get to the premises to fix as the bridges are washed away etc.
- In the context of this product, demand surge inflation could affect the pricing and profitability of the product.
- Demand surge inflation will affect certain countries more than others and therefore would affect the price per policy for that country.
- LargeCo will need to monitor the market closely and be prepared to adjust their strategies to adapt to changing market conditions.

QUESTION 2

(i)

- A captive is an insurer wholly owned by a commercial enterprise
- The primary purpose of which is to insure the parent or associated group companies.
- Premiums and risks are retained within the group
- Some captives will also sell insurance to customers of the parent company – also referred to as a third party captive
- Captives may insure external companies if they have the relevant expertise and risk appetite.

(ii)

Advantages of setting up a captive

- Retains insurance profit within the group thereby potentially increasing overall profits.
- Could also sell to customers boosting profits further.
- Could increase awareness of risks leading them to be managed more effectively.
- Reserves come from pre-tax profits
- Direct access to reinsurance market (and its expertise).
- If domicile is flexible there may be further tax benefits, e.g., Bermuda / Isle of Man
- Could provide coverages that are not typically available in the open market
- May be legislative advantages in rather insuring something through an insurance license vs using a banking license (*with an applicable example*)

Disadvantages of setting up a captive

- May increase volatility of results
- Although this could be mitigated through reinsurance
- Possible accumulation of risks
- Complex and costly to set up and run
- Lack of internal expertise for pricing / reserving etc
- Lack of policy & claims admin experience
- Onerous governance and legislative requirements
 - May not have authorisation for all classes of business
- Ties up capital that may be better employed elsewhere
- May take up valuable management time
- Reinsurance may not be available at suitable price / design

(iii)

Q i, ii & iii are all largely bookwork, with the above being well explained in both the F103 and F203 notes.

Covers professionals against the consequences of flawed professional advice.

The benefit may be restricted by:

- A maximum claim amount per event
- A maximum aggregate over one year
- An excess or deductible
- Insured retaining a proportion of any claim
- A maximum amount per claim.
- The policy will also normally cover legal costs.
- Sometimes compulsory for certain professions

Claim characteristics:

- Generally low frequency
- Can be long notification delays (*if explained together with claims made basis becomes irrelevant – so tested the candidates ability to bring these concepts together*)
- Can be long settlement delays
- Costs to the insured may be significantly higher than recoverable amounts with reputational & other damages
- Legal costs, particularly re litigating claims, can be significant
- There are often cover restrictions and exclusions
- Key exposure measure is usually fees
- Claims can be high when they do occur and subject to court award inflation and earnings
- Potential for an accumulation of risk following on from precedent cases
- Development is often slow, medium to long term business
- Affected by changes in legislation/regulation
- e.g., changes in legislation affecting advice or actions retrospectively, latent claims in medical malpractice, moral hazard
- Sometimes rated on experience basis for larger clients
- Development longer for some professions where the consequences of poor 'advice take longer to be realised (e.g., architects) Legal costs are usually covered
- Written to defined policy limits — no unlimited liability
- Even those claims that do emerge can cover fairly unique situations that are often tested in court requiring highly subjective valuations based on good understanding of the risks and Rating Factors

Rating Factors (Max 2 marks)

- Fees written / Turnover
- Type of profession
- Number of Employees in the firm
- Maximum exposure selected
- Past claims experience

(iv)

A Few candidates realised the contagion effect should the captive insurer be significant enough so that a stressed event to the captive causes a stress event to the conglomerate.

Also, most captives operate by just accessing the RI markets directly – as opposed to really self-insuring large risks.

- If the purpose of the captive is to provide cover exclusively for the risks of the undertaking or group to which it belongs (*Will need to check the contagion risk of the group though – else you could have a systemic event following the failure of the captive*)
- and so, does not provide cover for third parties or other insurable risks outside the group
- If the captive demonstrates good risk management or achieves risk diversification.
- Captive might achieve greater efficiency,
- Captive might operate in region with lighter regulator requirement.

(v)

Practical application. Many students did not mention explicit lines rather what they would consider – whereas the intention was to think about what such a group would insure and what could then be successfully placed in traditional markets.

- Will depend on the products place in the reinsurance market.
- Typically, you can work on big deductibles within the captive and the idea is to have access to the reinsurance market directly
- Will be a balance between the exposure the group has and the premiums available, typically referencing the premiums paid to external insurers before starting the captive.
- You will need to determine the regulatory and economic capital requirements of the Captive
- Regulatory restrictions, particularly around compulsory covers such as EL
- Ability to achieve risk management improvements from being closer to the loss experience
- Consider the risk appetite of the overall group
- Consider the risk appetite of local business units within the group (e.g. may retain the lowest level exposure locally that they'd currently manage in the external deductibles and use the captive for the middle bandings)

- Relative access to and ease of the following functions: administrative, pricing, claims handling, actuarial, compliance etc ability to manage it
- Consider regulatory restrictions, particularly around compulsory covers such as Employers Liability
- ability to achieve risk management improvements from being closer to the loss experience

More likely to transfer to captive (if reinsurance markets are available)

- Professional Indemnity Cover
- Directors & Officers cover
- Product liability
- Public liability
- Business interruption
- Cyber Liability type cover

Unlikely to be able to replicate the external Market efficiencies - on any of the highly competitive retail type coverage including:

- Motor fleet type covers
- Lower layer property covers / smaller property type insurance cover
- Accident and Health and Travel type policies
- Employers' liability cover
- Marine Cargo Cover

(vi)

Better students again understood the practicality of the question. Many however went very generic applying frequency x severity type arguments considering the risk premium – which was not the question.

- Management level of risk tolerance
- Current external insurance spend which may affect internal expectations from business units for expected charges Projected expenses associated with running the captive
- Projected capital requirements
- Including initial regulatory and economic capital required to establish the captive
- Expected extent of use of reinsurance and the associated premium
- Expected volatility of claims
 - Consider trends in inflation associated with claims, expenses
- Any trends in claims over the last number of years
 - e.g., employers' liability may have suffered latent claims
- Consider any changes in exposure or mix of business over time
- Is the company expanding/contracting

- Willingness to overfund to reduce the level of regulatory attention on the captive
- Materiality of captive premiums relative to the overall turnover and / or profits of the company
- Complexities of internal structures for over funding / returning any over funding of premiums

(vii)

Standard capital type question – but wanted students to focus on captive’s aspect. Therefore generic type capital answers were only given limited credit.

- What locations does XYZ operate in?
- Where is the domicile of the Captive?
- Type of insurances placed in the captive,
- Pure captive or writing external business too?

Need to further consider:

- Premium volumes
- Expected growth in premium volume
- Profit margins within premiums
- Reinsurance programme
- Credit risk of reinsurance panel
- Reserving methodology
- Likely investments & investment strategy
- Operational risks & how they may be mitigated
- SAM or other legislation requirements, if applicable, for captives
- Diversification between lines of business
- Data available (i.e. method 1 vs method 2 CAT factors being applied)
- Costs of capital
- Classes written exposure to accumulations or catastrophes
- Limits & retention of the captive

QUESTION 3

Little bit of professionalism tested in the question. Part 1 was well answered, and most students seemed to have seen a HAF report.

Part 2 – the part focusing on assumptions and methodologies was not well answered.

(i)

- Coordinate/oversee the calculation of technical provisions;
- ensure the appropriateness of the methodologies and underlying models used as well as the assumptions made in the calculation of technical provisions
- assess the sufficiency and quality of the data used in the calculation of technical provisions;
- compare best estimates against experience;
- inform the administrative or management body of the reliability and adequacy of the calculation of technical provisions;
- express an opinion on the overall underwriting policy;
- express an opinion on the adequacy of reinsurance arrangements;
- contribute to the effective implementation of the risk management system, in particular with respect to the risk modelling underlying the calculation of the capital requirements.

(ii)

- The actuary should select the assumptions and methodology that are appropriate for the work.
- The actuary should consider the needs of the intended users and the purpose of the actuarial services
- In selecting assumptions and methodology, the actuary should consider the circumstances of the organization,
- the basis of the actuarial services, and the assignment, as well as relevant industry and professional practices
- The actuary should consider to what extent it is appropriate to adjust assumptions or methodology to compensate for known deficiencies in the available data.
- The actuary should consider to what extent it is appropriate to use assumptions or methodology if they have a known significant bias to underestimation or overestimation of the result.
- The actuary should consider the appropriateness of the assumptions underlying each component of the methodology used.
- Assumptions generally involve significant professional judgment as to the appropriateness of the methodology used and the parameters underlying the application of such methodology.
- Assumptions may (if permitted in the circumstances) be implicit or explicit and may involve interpreting past data and other information or projecting future trends.
- Internal Consistency of Assumptions and Methodology
- The actuary should determine if the assumptions and methodology used for different components of the work are materially consistent, and that any significant interdependencies are modelled appropriately.
- The actuary should disclose any material inconsistencies in any report.

- Alternative Assumptions and Sensitivity Testing.
- The actuary should consider and address the sensitivity of each methodology to the effect of variations in key assumptions, when appropriate. In determining whether sensitivity has been appropriately addressed.

END OF REPORT