

EXAMINATION - MEMO

14 April 2026 (am)

Subject A311 — Actuarial Risk Management

Core Principles

Paper One

EXAMINERS' REPORT

This subject report has been written with the aim of helping candidates. This report summarises the main points that the examiners were looking for and some common problems encountered.

2026 - Paper 1 Solutions

QUESTION 1

Examiner comments: Many candidates were not familiar with the bookwork for part (i) and struggled to articulate the concept and consequently missed out on a few easy marks. Candidates generally did well under part (ii), but there were cases where candidates repeat the same concept. For example, listing “ID number of parents” and “ID number of child” separately will not be awarded marks twice. While the solution below focuses on information of children and parents, credit was given for information pertaining to the school or staff.

(i)

Definition

- Data governance is the term used to describe the overall management of the...
 - availability,
 - usability,
 - integrity,
 - and security of data in an organisation

Contents of a data governance policy

- Specific roles and responsibilities of people in the company with regards to data
- How an organisation will capture, analyse and process data
- Issues with regards to data security and privacy
- Controls put in place to make sure standards are met
- How the controls will be monitored
- Mechanisms to ensure all legal and regulatory requirements around data management are met.

(ii)

- Identity numbers of children / parents
- Addresses of learners / families
- Contact details of parents or students (e.g. email addresses etc.)
- Academic records of learners
- Information on extracurricular activities
- Religious information of learners / families
- Possibly medical information (e.g. medical scheme numbers)...
- ...and possibly even medical history, at least as far as it relates to the child’s time at the school (e.g. special accommodations).
- Nature of the learner / family account’s standing with the school.
- Confidential information about disciplinary and other sensitive matters.

QUESTION 2

Examiner comments: Candidates generally performed very well on this question. Weaker candidates did not always relate their points specifically to the topic of calculating provisions or would mention stakeholders that are largely unaffected, if at all, by the insurer's provisions e.g. investment managers and competitors.

Board of directors

- They are responsible for the sufficiency, fairness and accuracy of the figures, including reserves, in the audited financials.

Senior management

- The head of valuations would be held responsible for the timely delivery of reserve calculations
- Other members of management's performance measurement will be affected by the outcome of the valuation exercise (e.g. surplus arising, value of new business, VIF etc.)

Shareholders

- The level of dividend that the shareholders of the insurance company receive...
- ...will be affected by the basis used for setting the provisions.
- Shareholders also require the financials to represent a fair and true reflection of the state of the company that can be used for investment decisions.

Auditors

- They sign off the audited financials. Any discrepancies or non-compliance will reflect badly on them.

Existing policyholders

- Whether the company would remain solvent to meet the future policyholder claims

Prospective policyholders

- Whether the company is a sound option to purchase insurance from.

Regulators

- Whether the company remains solvent...
- ...and complies with all legislation governing reserving and reporting thereon.

Reinsurers

- Depending on the reinsurance contract structure, their own provisions may potentially be affected.

Creditors

- Whether the company is financially sound enough to continue meeting its future obligations.

Tax authority

- Provisions that are too high will delay profits and hence taxes.

QUESTION 3

Examiner comments: Better candidates recognized that part (i) draws on ideas from the bookwork on the merits of equity analysts specialising in a specific sector and hence scored well. Many candidates struggled with a logical structure for part (ii) and would often miss obvious elements of the cashflow projection. Most students struggled to clearly explain the steps required in part (iii).

(i)

Practicality

- Factors affecting one company within an industry are likely to be relevant to other companies in the same industry.
- Much of the information for companies in the same industry will come from a common source and will be presented in a similar way.
- Analysing a business based on some common factors gives structure to the decision-making process of the terms of a loan, and whether to lend.
- It allows the bank's different analysts to specialise in specific industries/sectors.

Correlation

- Changes in operating environment affect companies in individual industries in similar ways.
- Companies in the same sector will use similar resources (e.g. labour, land and raw materials), and will therefore have similar input costs.
- Companies in the same sector supply to the same markets...
- ...and will therefore be similarly affected by changes in demand.
- Companies in the same sector often have similar financial structures...
- ...and will therefore be similarly affected by changes in interest rates.

Other

- Companies in the same sector might have similar types of asset structure and can give similar collateral (if any).
- When modelling repayment and defaults, loans from the same industry can be grouped to form one "model point".

(ii)

- Under the various scenarios the company needs to model the assets vs. liabilities and their build-up over time
 - i.e. project balance sheet and income statement at a point in the future.
 - Check financial strength at any time-point.

Data input, from the balance sheet:

- Current levels of debt funding, with rates
- Level of assets (actual + outstanding loans granted)
- Bad debt provisions (with calculation criteria)

Loan data and model

- Create model points of loan book.
- Split by industry and possibly tiered by loan size.

Assumptions

- Repayment and default patterns (including collateral, recovery and legal costs)
- Default model based on analysis of historic data, with dimensions for industry, loan size and economic scenario.
 - Could be a transition matrix of credit rating.
- Interest rate received under each scenario.
- Discount rate for future cashflows
- New loan extensions, per industry and size of loans.
 - (Perhaps fewer loans under economy slow-down scenarios)
- Model collateral given per industry, based on recent averages in each industry.
- Outflows
 - Usual business expenses (overheads, e.g. from a 5-year budget)
 - Expense inflation
 - Planned or anticipated capital expenditure or business expansions
 - Interest on any debt, dividends declared.
- Inflows
 - Loan repayments
 - Including interest
 - Investment returns etc.

(iii)

- A key distinction with the stochastic model is that the scenarios don't have to be pre-specified with specified parameter values as with the deterministic model.
- Choose a suitable method / distribution etc. for generating one or more of the economic variables stochastically, e.g. interest rates.
- Different economic scenarios will be represented by the combinations of both the stochastically produced and deterministic parameters
- Care needs to be taken that the distributions of the stochastic variables and their joint distributions between all the variables are sensible
- Different scenarios will represent different levels of:
 - Industry economic activity and associated default models
 - Lending and borrowing rates under each economic scenario.
- Check that the goodness of fit is acceptable
 - This can be done by feeding the deterministic scenarios to the stochastic model and comparing the results with the deterministic projection model results, and/or
 - Running an actual past year and comparing the model with the actual results.

QUESTION 4

Examiner comments: Part (i) was a straightforward question, and many candidates achieved full marks. Part (ii) was a broad question with a large range of acceptable answers with most candidates providing several valid risks and mitigations. However, most students struggled to provide sufficient points for a 10-mark question. Weaker candidates would list risks that are very similar to each other.

(i)

The main steps involved in the initial stages of a general risk analysis can be summarised as follows:

- Make a high-level preliminary risk analysis...
- ...to confirm that the project does not obviously have such a high-risk profile that it is not worth analysing further.
- Hold a brainstorming session...
- ...involving project experts and senior internal and external people who are used to thinking strategically about the long term.
 - Include persons from other municipalities who have undertaken similar projects and their experience
- The goal would be to identify project risks, both likely and unlikely and those positive and negative outcomes as well as:
 - Consider the interdependency of these risks.
 - Attempt a broad initial evaluation of each risk focusing on both frequency of occurrence...
 - ...and consequences if it does occur.
 - Produce initial outline of mitigation options.
- Carry out a desktop analysis to identify further risks and mitigations...
- ...researching similar projects undertaken in the past by the sponsor or others.
 - Research alternatives to wind, e.g. solar, hydro which may be practical
 - Local and overseas experience
- Carefully set out all the identified risks in a risk register...
- ...with cross references to other risks where there is interdependency.
- A risk matrix is a useful tool providing a categorisation of risks and summarising risks at each stage of the project.

(ii)

- Risk: Government approval is not obtained (e.g. due to opposition from various stakeholders, such as the existing supplier, environmentalists etc).
 - Mitigation: Address any concerns such that there is no opposition or cause for government to withhold approval.

- Risk: The owners of the land are not willing to sell.
 - Mitigation: Assist landowners to find alternative land and offer attractive compensation.
- Risk: Opposition from town people for the construction and payment for the construction costs and electricity
 - Mitigation: Compile a complete business plan including projections highlighting the long-term benefits in terms of independence from the national grid and potentially lower electricity costs in the longer term.
- Risk: Lack of adequate infrastructure for the development and operation of the wind farm (roads, water, cables for carrying power to the town).
 - Mitigation: Obtain government support to develop the region by highlighting the benefits to the community of doing so.
- Risk: Lack of local technical expertise during the construction phase and during the operation phase.
 - Mitigation: Utilise experts from other similar projects; longer term develop local talent through training.
- Risk: Project costs exceeding available funding.
 - Mitigation: Employ an experienced project manager that can minimise this risk; hedging of financial variables that impact costs e.g. local currency.
- Risk: Natural disasters during construction or operation.
 - Mitigation: Obtain insurance to cover financial implications.
- Risk: Not meeting the required deadline (e.g. due to approval delays, land acquisition, infrastructure development, natural disasters during construction).
 - Mitigation: Agree with the funding agency to extend the deadline for events outside the project team's control.
- Risk: Future governments not supporting the project (and not providing adequate protections e.g. allowing seismic-inducing mining activities nearby).
 - Mitigation: Encourage current government to pass legislation to enforce necessary protections; interact with future governments to address any concerns.
- Risk: Project finance does not become available as expected.
 - Mitigation: Seek alternative funding sources.
- Risk: Debt servicing becoming more expensive than anticipated, e.g. interest rates increasing

- Mitigation: Negotiate fixed rates, or enter into an interest rate swap agreement.
- Risk: Crime and vandalism (e.g. fraud by contracting parties, wind turbines damaged), or theft of equipment, cables, etc. during construction
 - Mitigation: Only contract with parties that have no criminal records; implement stringent controls and monitoring on use of funding.
 - Employ a security agency to safeguard the site
- Risk: Climate and wind pattern changes leading to insufficient power being generated (or demand exceeding supply if the town grows significantly)
 - Mitigation: Engage experts to model various scenarios for wind generation going forward as well as a range of possibilities for future demand.
 - It may be possible to “sell back” excess power to the national grid, in which case the project could be expanded to allow for future reductions in generation.
- Risk: Unable to repay funders due to non-payment of services by town population
 - Mitigation: Sell power on a PAYG basis; the funder could enter into a credit insurance arrangement

Credit was awarded for other sensible risks and mitigation options.

QUESTION 5

Examiner comments: Overall, candidates scored well for on part (i) of this question, with stronger candidates understanding that the breadth of their answers was more important than going into detail on any one particular point. Some candidates mistakenly listed rating factors as opposed to product development considerations and hence scored poorly. Part (ii) was well answered, but weaker candidates continue to write too much for a “list” type question. In some cases, the factors stated were too cryptic to score marks, e.g. just saying “margins”.

(i)

Needs of the customer

- Ensure that the product meets the financial needs of the intended customer,
- The entry and exit ages should be appropriate and for the target clients (i.e. a few years before and after the typical retirement age.
- What level of flexibility in the premium structure (level vs. increasing) clients would prefer.
- Premiums that are adjusted annually in line with increased mortality risk,...
- ...would likely not be very attractive...
- ...since mortality increases steeply at higher ages.
- Design product with long term flexibility in mind to allow the clients to change/reduce their sum assured as they grow older and may not have the initial insurance need anymore.

Needs of the provider

- The provider’s risk appetite and desired profits from this product
- The extent of any existing experience and expertise in this market
- The level of capital available to back this product
- Administration/systems requirements
- Expenses involved in designing and administering the product

Distribution channel to be used for the product

- Will it be sold via agents/brokers or over the phone/internet.
- Consider sales and marketing costs of product

Regulatory environment

- Any new product should comply with any legal or regulatory requirements,
- May need approval from the regulator before being able to launch the product,
- May be tax advantages to either the customer or provider with this product.
- Price and product features - restrictions,

Marketability & Profitability

- Can the product be sold at the required profitability

- ... Or Cross-subsidies from other business to boost attractiveness and maintain overall profit requirements
- Marketability and Profitability may be in conflict with each other, exacerbated by Competitive pressures
- ...if a similar product already exists in the market and
- ...if not consider how competitors might respond,
- The company may have first mover advantage as the product is unlikely to be available, but it is a simple product and competitors may soon follow suit, squeezing margins

Level and form of benefits to be provided

- Any options or guarantees that might be included especially ability to increase sum assured after the initial risk assessment.
- Premium guarantees to be included in the product.
- Any flexibility in how the benefits may be paid...
- ...e.g. a portion of their benefits accessible upon diagnosis of a terminal illness.
- Product covers older lives so likely to be substandard/additional risks to consider in the underwriting process

(ii)

- Lapse rates
- Investment income for the product
- Expenses, such as
 - Initial underwriting, renewal, terminal expenses
- Commission payable to the distribution channels
- Cost of the capital supporting the business
- The required profit margin to be applied.
- Reinsurance costs and availability for the product
- Whether any margins for contingencies are necessary
- Taxation of profits (*or other valid tax issues*)
- How to allow for the cost of options and guarantees not allowed for in the base rate already.
- The basis used to set future provisions for the liabilities (which may be different from the basis used to determine the benefit costs for the purposes of office premium calculations.)
- Adjustments to the premium for cross-subsidies (between ages, products)

QUESTION 6

Examiner comments: Part (i) had a clear bookwork framework and was handled well by most of the candidates. Most candidates struggled to provide relevant examples in part (ii) of the question, with many pointing to an improbable scenario of policyholders self-inflicting injuries to claim from the policy.

(i)

- Policyholder should have an interest in the risk being insured
 - Requirement is met as the policyholder would have had to prepay for the race entry.
- The risk must be of a financial and reasonably quantifiable nature
 - Requirement is met as the race fee is a fixed, known amount
- The amount payable should bear some relationship to the financial loss incurred
 - Requirement met as cancelled event or being unable to participate means that the entry fee will be forfeited/lost
- Individual risk events should ideally be independent of each other
 - Requirement is partially met as individual injuries should be independent, but event cancellations may affect many policyholders at once
- The probability of the event occurring should be relatively small
 - Criteria should be met as events are normally only cancelled in very adverse conditions,...
 - ...and depending on the policy wording of what constitutes a valid injury, the claim probability can be acceptably small.
- Large number of similar risks should ideally be pooled to reduce the variance
 - Requirement could be met if uptake is good across events across geographic areas
- There should be an ultimate limit on the liability undertaken by the insurer
 - Requirement is met as liability is limited to race entry fee
- Moral hazard should be eliminated as far as possible
 - Condition may be difficult to meet as individuals who can't participate in the event for reasons other than illness/injury will have the incentive to claim to get refunded the entry
- Sufficient data should be available to estimate the likelihood of occurrence and the extent of the risk
 - Condition should be met as data on event cancellations and reasons can be obtained, and similarly for injuries and injury risk

(ii)

- Moral hazard will be present when policyholders try to claim on their policies for reasons other than illness or injury...
- ...e.g. due to oversleeping or not feeling like participating, etc.
- This will be a form of fraud (dishonesty).

- There is unlikely to be any moral hazard for the race cancellation benefit.

Product design features to assist in managing moral hazard risk:

- Claims underwriting - Require a medical professional to verify the illness/injury before approving the claim (cost and hassle which would discourage fraudulent claims)
 - Can also require certain actions within a specified time limit, e.g. consulting the medical professional should be done within 3 days before or after the event.
- Limit the benefit amount to a maximum proportion of the race fees
- Or to a maximum monetary amount (as some race events can be very costly)
- Offer only one opportunity to take up the cover, i.e. at the point of entering the event
- Clear policy wording defining injury/illness that will qualify for a valid claim
- Single premium payable at point of entering event – then policyholders can't lapse as the value of the policy reduces to them as date to event nears
- Offer no surrender benefits
- Waiting periods to allow time for participant to recover before accepting a claim, e.g. claims only payable after the event has taken place.
 - i.e. injury/illness 2 months prior will not trigger claim, unless verified still present in acceptability window of a given number of days (e.g. 3) either side of events.
- Exclusions of pre-existing injuries/illnesses flaring up
- Termination of cover if started the event – to avoid claims from injuries occurring during the event or not finishing the event for any other reason.
- Initial underwriting, e.g. declaration of good health at time of entering event.
- Age limits, e.g. <70 and >20 to qualify for the insurance – reduced risk of injury/illness

QUESTION 7

Examiner comments: Overall, this question was answered well by most candidates. Stronger candidates structured their answers well with the result that they were able to produce sufficient different points. For part (i) better responses were those where candidates separated out own damage and third-party. Weaker candidates would spend too much time on how to calculate the reserves as opposed to understanding how they behave. Part (ii) was bookwork and generally candidates did well, but many still lost out on two or so easy marks by not listing enough distinct reasons. Candidates who systematically worked through the income statement line of a general insurer and kept their responses simple generally scored well in part (iii). Weaker candidates would often labour points of marginal importance (e.g. lapses) at the costs of much more important points (e.g. claims volumes). Many ignored the information given of premium growth completely.

(i)

Own damage component

- This cover is short-tailed...
- ...and the amounts would be reasonably predictable or at the very least capped by the value of the vehicle itself.
- Own damage claims are expected to occur relatively frequently.
- Claims may increase with inflation but are generally increasing at the same rate (or intervals) that premiums would.
- Claims would also be in the local currency

Third-party component

- The third party claims would be of lower frequency...
- ...but higher severity, and hence significantly more unpredictable.
- These risks are long-tailed...
- ...as claims typically take long to go through the legal system.
- Hence, reserves would need to be calculated and held for both known claims (outstanding claims reserves)...
- ...as well as incurred but not reported claims (IBNR).
- These claims may be exposed to court/legal inflation...

(ii)

- Show the financial effects of divergences between valuation assumptions and actual experience
- Determine the assumptions that are the most financially significant
- Show the financial effect of writing new business
- Validate calculations and assumptions
- Provide a check on the valuation data and process (if carried out independently)

- Identify non-recurring components of surplus, to help make decisions about distribution of surplus
- Reconcile values for successive years
- Provide management information
- Provide data for use in executive remuneration schemes
- Provide information for the provider's accounts
- Demonstrate that the variance of the parts is a complete description of the whole
- Give information on trends in the experience of the provider to feed back into the actuarial control cycle.

(iii)

- Claims experience may have been heavier than the previous year
 - Increased frequency and/or severity of claims
 - Catastrophic claim events
 - Strengthening of the basis used in the third-party liability reserve calculation
- The increase of GWP may have been a result of writing poor performing new business at insufficient premium levels
- There may have been a shift in the mix of business, whereby profitable policyholders left the risk pool
- The higher GWP may have come because of initiatives requiring higher expense outflow...
- ...or higher commission rates
- Inflation in expenses were higher than the growth in GWP
- Similarly, inflation in claims costs were higher than the topline growth
- The cost of reinsurance may have increased
- Investment income may have been lower.
 - It is expected that investment income would be a significant, given the long-tailed nature of the business written and hence large provisions held for liabilities.
- There may have been a change in the taxation rate.
- Shorter settlement delays (less investment return earned on reserves),
- Or higher legal costs associated with liability claims (longer court proceedings)

QUESTION 8

Examiner comments: Most of this question required bookwork, and hence well-prepared candidates scored better, especially on parts (i) and (ii). However, many candidates could not generate enough distinct and clear points to score well. Candidates seemed to struggle coming up with a structure for part (iii) and generally not writing enough for the number of marks required.

(i)

- Unit trusts provide an investor the opportunity to buy units in a pool of underlying listed assets managed by the fund manager.
- Direct listed equity investment requires individuals to buy/sell individual shares themselves (obviously via an exchange/investment platform).
- Each unit is effectively made up of a potentially wide spread of equity investments...
- ...and hence potentially better diversification is achieved
- Achieving diversification may be difficult when investing directly...
- ...either due to lack of funds...
- ...or limited expertise.
- The unit trust usually has a stated objective, e.g. to achieve inflation plus 5% return,...
- ...and the fund manager would have the expertise to build a pool of assets to try and achieve the stated objectives.
- Investing directly in equities would require the investor to create their own investment strategy...
- ...and pick the shares individually.
- Unit trusts often have liquidity guaranteed by the provider...
- ...while trading directly in equities may expose the investor to the risk of illiquid markets for a certain share.

(ii)

Advantages

- The assets and liabilities are in the same currency therefore no currency risk
- There is potentially good degree of matching between assets and liabilities...
- ...since actuarial value of liabilities will move in line with interest rates,...
- ...corresponding to the movement in government bond values.
- Government bonds generally have the lowest credit risk in terms of security of coupons and maturity payments...
- ...or at the very least the same credit worthiness as the issuing state.
- Asset values should have low volatility as they are unlikely to move in large amounts unless there is a crisis.
- It is unlikely that any trades from MaLife would move the market values of assets...
- ...both because of their size and the size of the bond market.
- In a large market there will be a wide range of coupons and maturities/tenures to match the liability profile.

- Usually, a large liquid market exists making it easier to build and trade an appropriate portfolio.
- May be easier to manage such a portfolio...
- ...given that it is a small company that is unlikely to have the required internal expertise.
- There may be regulatory advantages/incentives to reduce the capital requirements...
- ...which may be especially useful for a small company.
- Low dealing charges and possibly favourable tax position

Disadvantages

- It is likely to be lower yielding than other asset classes (closest to risk-free rate)
- If competitors are investing in higher yielding assets...
- ...the annuity rates being offered may be uncompetitive.
- Specialist technical expertise is still needed (interest rate and duration risk issues)
- There may not be bonds of all the required durations (gaps)...
- ...or the longest dated may not be long enough.
- Reinvestment risk for coupons and maturities if not matched with liability outflows.
- There will be lack of diversification for the portfolio...
- ...and therefore, elevated risk in times of crisis for the state.
- Cannot discount market stresses causing volatility in discount rates and prices, undermining risk-free nature.

(iii)

- Assess the potential risk of the change
 - The impact of equity investments on the extent to which assets and liabilities are matched
 - How will the overall portfolio values change when interest rates move
 - The extent to which the valuation (or value) of existing liabilities would need to change
- The potential for increased return...
- ...balanced against the cost / risks.
- Regulatory considerations
- Impact on solvency
 - Admissibility of assets for demonstrating solvency
 - Likely that the inclusion of equities may have an impact on capital requirements...
 - ...whether economic or regulatory
 - The level of current free assets MaLife has...
 - ...that can absorb either the increased capital requirements or allow for bigger mismatching between assets and liabilities.
- The likely additional costs of including equities in the portfolio
 - Sale of bonds at favourable prices and similar for purchase of equities, i.e.
 - Is the timing of the change good?
- What expertise is available to manage the equity exposure...
- ...either in-house or fund managers in the market.

- What competitors are doing
- Impact on credit rating of MaLife
- Tax implications on MaLife.