

EXAMINATION - MEMO

16 April 2026 (am)

Subject A311 — Actuarial Risk Management Core Principles

Paper Two

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 2 Solutions

QUESTION 1

Examiner comments: This question was generally answered well. Some candidates mixed up financial reinsurance and securitisation. Weaker candidates could mention the tool but not illustrate with an example.

- Reinsurance
 - Part of the risk transferred to the reinsurer, reducing capital requirements
 - a catastrophe treaty to protect solvency in the case of a natural disaster and hence reducing capital requirements.
- Financial Reinsurance (FinRe)
 - Crystallising the future profits locked up in a portfolio of life insurance policies reinsuring it as a block in exchange for an upfront payment of cash from the reinsurer.
- Securitisation
 - a catastrophe bond to transfer some catastrophe risk to the capital/bond markets – receive capital upfront
- Subordinated debt
 - Issuing debt that only incurs interest and only gets repaid once all regulatory capital requirements have been satisfied and hence will not show as liability on the balance sheet.
- Banking products
 - Liquidity facilities, e.g. overdrafts with a bank.
- Derivatives
 - a currency future to hedge against adverse movements in exchange rates
- Equity capital
 - issuing more shares to raise capital; capital injection from parent company
- Internal sources of funds (or internal restructuring)
 - Restructuring of asset composition to reduce capital requirements
 - Changes in the level of confidence for capital requirements
 - Not paying dividends until capitalised sufficiently

QUESTION 2

Examiner comments: Part (i) was answered well. Weaker candidates would elaborate on reasons for capital that were not applicable to the setting, in this case a start-up life insurer. Part (ii) of the question is simple bookwork and was generally answered well.

(i)

- X-Life will need “start up” capital to obtain premises, hire staff, purchase equipment etc.
- They will also need to set up suitable management systems...
- ...to administer the liabilities, collect premiums, etc.
- Given that they are new, there may be significant marketing expenses at the outset to establish the brand.
- Until sufficient premiums have been collected, X-Life will need to meet these start-up costs from capital.
- Writing new term assurance policies will incur costs (e.g. underwriting) before any premiums have been received...
- ...which creates a cash flow strain and a need for capital.
- This will especially be the case if intermediaries are paid upfront.
- There is a possibility that claims may arise before the provider has had time to accumulate sufficient funds from premiums/contributions to pay the benefits.
- Working capital will be required to smooth out fluctuations in business volumes...
- ...e.g. in months where a lot of policies are sold, upfront expenses will exceed premiums.
- There will likely be a regulatory requirement to set up provisions for future liabilities...
- ...which will be set in excess of the best estimate value of future outflows...
- ...and hence likely higher than the basis used in pricing.
- The company will need more capital if they want to invest the premiums in assets that don't match the liability profile.
- X-Sure would need sufficient capital to demonstrate financial strength to their target market...
- ...as well as potential rating agencies and/or providers of capital.
- Capital may be required to support any guarantees in X-Sure's products...
- ...such as guaranteeing premium rates for a minimum period.

(ii)

- To protect X-Life from anti-selection
- Underwriting will enable X-Life to identify risks for which special terms will need to be quoted.
- For substandard risks, to identify the approach (e.g. premium loading, declining risk etc.)...

- ...and the level of the special terms to be offered.
- To aid in risk classification, which helps to ensure that all X-Life's risks are rated fairly...
- ...and also to provide data for analysis later.
- Underwriting will help in ensuring that claims experience is aligned with the pricing assumptions,
- ...i.e. risks exposed to are the risks they are prepared to be exposed to.
- Underwriting at the claims stage can help prevent fraudulent or excessive claims
- Especially for larger sums insured, financial underwriting will reduce the risk of over-insurance.

QUESTION 3

Examiner comments: *This question was generally poorly answered. Unfortunately, many students did not read this question properly and responded by suggesting an investment strategy for the liability, not the various financing options. Those who did respond correctly were, for the most part, able to identify the generic bookwork points but did not apply these to the question correctly. A common mistake was to assume that the fund took on the additional defined liability, not the employer. An alarming number of candidates recommended using current DC member contributions to fund the benefit, which means they either do not understand DC funds or the setting provided.*

For all methods the following should be considered:

- Tax treatment of each method.
- General current business risks and risk appetite of the provider

Pay as you go

- The top up payments are made as and when they fall due from current company profits.
- This may work well for a company with high and predictable profits and a relatively young average workforce and/or high staff turnover.
- MegaCorp will need to check if this will always be possible, especially in periods where the company makes little or no profits.
- Given that this is a once-off, lump sum top-up payment, the pay as you go approach is *essentially the same as terminal funding*.

Smoothed Pay as you go

- The top up payments are made as and when they fall due from current company profits.
- The company will however set up a small provision to smooth out timing differences in liabilities and profits.
- This is likely one of the best most reasonable and simple options,...
- ...since it is likely that the company does not generally expect to make top up payments (as seen in the relatively low frequency of top up payments)...
- ...but in the instances that they do need to make payments, the impact would be lower.

Funded approach

- Provisions that are expected to be sufficient to meet the cost of the benefit are set up as soon as the benefit promised is made (i.e. at starting employment at MegaCorp).
- The fund would also need to quantify the liability on an ongoing basis as the guarantee might bite in some scenarios, e.g.
 - Steep salary growth of some members, especially close to retirement
 - Poor market performance of assets of members close to retirement
- Could have a big impact on financials in years where many people are hired...
- ...but presents the most conservative view of the provisions required.
- The fund may turn out to be too low or high depending on the difference between assumptions used and actual experience.

Regular contributions

- Funds are gradually built up to a level to be sufficient to meet the cost of the benefit...
- ... likely over the course of employment.
- Would require regular valuations of the potential liability...
- ...which is likely happening in any case already since the contribution to the DC fund is revisited from time to time.
- This approach would respond more gradually to changes in a member's salary (e.g. after a promotion)

Just in time

- Funds that are expected to be sufficient to meet the cost of the benefit are set up as soon as a risk arises in relation to the future financing of the benefits.
- This could also work for MegaCorp if they are generally expected to be profitable, but want to set funds aside as soon as there is a foreseeable risk of their profits significantly reducing...
- ...or the value of the underpin increasing.
 - For example, after a market crash or in the case of very low interest rates, the underpin might be more likely to bite and then the company will set aside funds for it.
- This maybe done when the MegaCorp is being bought over by another company...
- ...in order to ensure the value of the underpin is properly accounted for.

QUESTION 4

***Examiner comments:** This question was answered reasonably well by many, especially those candidates who took some time to think about what ZenSure is practically trying to accomplish here. While it is necessary to comment on the need for a predictive model and how one might go about building it, the intention of the question was to look at the overall problem end-to-end and not just a discussion on model building. A surprising number of candidates wanted to train intermediaries and clients on the working of the fraud detection process, which showed a lack of commercial awareness. Better candidates appreciated the need to balance cost and benefit of the new process.*

Specifying the problem

- The process' aim is to identify claims that are most likely to have an element of fraud.
- Claims that are more likely to be fraudulent will undergo more rigorous claims underwriting.
- The team would need to decide on options for more claims underwriting,...
- ...e.g. ranging from only requesting more documentation/quotes to appointing an external investigator.
- The number of false positives would need to be minimised to ensure as many as possible valid claims are still settled quickly/easily...
- ...especially given ZenSure's reputation.
- More claims underwriting also equals more expenses.

Developing the solution

- Model(s) for predicting / flagging high risk claims will be required...
- ...which will likely be a combination of a statistical model or ...
- ... models combined with expert input from claims underwriters.
- The process is likely to be different for different lines of business as levels of fraud may differ by product...
- ... and also by claim sizes or perils
- Data on past claims would be required to calibrate the models / rules.
- The models need to be tested for how accurately they flag actual fraudulent claims or high risk of fraud claims
- Could run past years' claims information through the model to test accuracy before implementing the solution
- And amend parameters/rules until an acceptable level of accuracy is obtained.

Monitoring the experience

- Regular monitoring of volumes being flagged as high risk would be required.

- And whether it is impacting claims turn-around and settlement times
 - Would not wish to damage the reputation of fast claims settlement, especially for false positives being flagged...
 - ...given that it is likely that the company only has a limited capacity for detailed claims underwriting.
- As more fraud is successfully identified, models and rules should be finetuned.
- Changes in clients and/or intermediaries' claims experience/feedback should be measured...
- ...to ensure that the brand doesn't suffer reputational damage.
- Going forward, data should include more information on the outcome (fraud or not) to facilitate better models going forward.
- Any shifts in claims patterns and what is disclosed at claim stage may signal that clients are responding to the process...
- ...either by not submitting certain claims, or by changing how they claim and what they disclose.
- The cost of implementing this process should be compared to the savings as a result of declining fraudulent claims.

General economic and commercial environment

- It would be ideal to know what other insurers are doing in this regard.
- Care should be taken to consider what effect this might have on the company's brand profile in the market.
- The state of the economy is often a driver of crime and fraud,...
- ...which may have an impact on the level of underwriting required.
- There is likely to be laws regulation around data privacy and what data may be used to assess claims...
- ...as well as the nature of investigations that may be conducted (e.g. requiring warrant for obtaining video footage).

Professionalism

- Treating the customer fairly is always important, especially at claims stage.
- The actuary would want to ensure that this process is in the interest of the client and the company...
- ...and that valid claims are still being paid.
- There might be guidance about how to build such predictive models.

QUESTION 5

Examiner comments: Part (i) was well answered with better candidates identifying the need for assumptions around family structure etc. Part (ii) was based on bookwork ideas and most candidates mentioned all three ways to allow for the uncertainty. Better candidates clearly elaborated on the methods by means of concrete examples within the setting. Part (iii) was not answered well. Many candidates implied that the insurer cannot change policy premiums easily and hence have to pick up the bill for that. While practically there may be some challenges to implement the change, it is unlikely to expect an insurer (or any company for that matter) to not be able to reprice their products when there is a VAT change, especially since the latter is imposed by the government. Candidates seem to have very limited knowledge of the basics of VAT, especially the fact that it is a value added tax (by definition!). While it is true that many of your expenses that include VAT will increase, so will the amount of VAT that you can claim back. Stronger candidates recognized that one big exception will be staff costs, since all employees are now effectively worse off. Most candidates recognised that demand for the product may decrease because of lower disposable income. Stronger candidates showed the opportunity to gain goodwill to absorb some of the cost if possible.

(i)

- Mortality rates for spouses and children
- Depending on the product design (or sales process) there may need to be an assumption on the ages of children / spouses...
- ...or even the number of lives covered (especially if marketed as a “bundle” type product).
- Changes to expense assumptions
 - upfront expenses might be different
 - claims expenses might be higher
- Lapse rates may be different for the combined product compared to the existing single life product
- New business volume assumptions might change.

(ii)

Best estimate plus margin

- There is uncertainty in the mortality benefit costs...
- ...as well as expenses, lapses assumed for the pricing/valuation.
- The actual liability cashflows projections can allow for the uncertainty by adding a risk margin to the best estimate assumptions.
- The level of margin will depend on the risk involved and availability of data to estimate accurate assumptions.
- For this product the company is unlikely to have data on mortality rates for dependents and spouses.
- For example, they may choose to add a higher risk margin to the mortality assumptions for spouses.

- There may need to also be careful on withdrawal or lapse rates which may be dependent on external factors like the state of the economy...
- ... even though they may have more data on this if targeting the same market, but they would still need to adjust as the products are different

Contingency margin

- This would involve adjusting the liability by certain percentage
- The percentage would need to reflect the uncertainty involved...
- ...perhaps increasing liability for policies with more dependents with a higher margin than policies with only the policyholder on.
- This may be seen as arbitrary...
- ...and may not be acceptable for us in certain circumstances like the liability to hold in the published accounts of the company, but...
- ...may be suitable for use in internal pricing if the rates are reviewable.

Discounting cashflows at a higher risk discount rate/risk premium

- Using best estimate assumptions of cashflows and then discounting at a higher rate of return...
- ...than for the more established product that reflects the overall risk of the new product.
- Determination of the increase in discount rate can be seen as arbitrary...
- ...and may not be acceptable for us in certain circumstances like the liability to hold in the published accounts of the company...
- ...but might be used for internal pricing of the product.

(iii)

- Obviously, premiums being calculated would have to respond to the increase in the VAT rate.
- The VAT change may require system changes in various places...
- ...such as policy admin platforms; claims platform; accounting systems etc.
- Processes around how VAT is collected and/or claimed back would need to be adjusted.
- The increase in VAT would likely lead to lower disposable income for clients...
- ...which may affect ALC's sales volumes...
- ...since fewer people will insure or those who insure will insure fewer lives.
- ...as well as lead to an increase in lapses.
- An increase in premiums may exacerbate this
- Valuation assumptions may need to be revisited...
- ...especially assumptions around lapses and expenses...
- ... and possibly interest rates (depending on effect on the economy).
- Employees would also effectively have less income to spend...
- ...which may put pressure on the level of salary increases...
- ...or even lead to staff looking for work elsewhere.

QUESTION 6

Examiner comments: The question was handled well for the most part, but what separated better candidates was their ability to list more than just the basic/obvious comments. Part (i) required candidates to draw on their bookwork knowledge of PMI products, and many were able to score well by providing sufficient distinct points. Some candidates listed the benefits of having PMI instead of the benefits typically offered by a PMI product and scored limited marks. Part (ii) was largely an application question – requiring candidates to apply their knowledge of things that may excessively push up claims over several years – not just over a single year. Overall, this question was not well answered. To score well, candidates needed to clearly explain why their point would lead to higher claims. Furthermore, candidates needed to demonstrate that their point was relevant over several years and was not just a once-off impact on claims. Many candidates struggled with generating sufficient distinct points – often repeating the same point several times. Part (iii) was well answered by most candidates, with many able to provide several different suggestions for managing the excessive claims.

(i)

- PMI products are short-term - annually renewable
- Typically, they are also annually reviewable
- Premiums are typically monthly, but may be pre-paid annually
- PMI can be sold individually or on a group basis
- Benefits are typically indemnity-type benefits covering the cost of private medical treatments obtained by the policyholder
- Subject to overall limits, co-payments and/or deductibles
- There will be exclusions, e.g. cosmetic care
- A comprehensive policy will cover both in-hospital and out-of-hospital benefits
- In-hospital benefits will cover both planned and unplanned (emergency) procedures
- Out-of-hospital benefits include GP visits, medication, radiology, pathology, and possibly dentistry and optometry benefits.
- Policyholders may need to seek care through designated service providers (DSP's)

(ii)

- Scarcity – reduced supply of doctors/specialists resulting in higher fees charged for their services
- Basis mismatch – the general medical inflation basket may not correspond to the medical goods and services required by policyholders and paid for by the insurer.
- Anti-selection – Older, sicker people taking up insurance and driving up claims costs faster, or,
 - Selective lapsing by younger, healthier policyholders
- Chronic condition incidence worsening – increasing claims cost,
 - E.g. more obesity, diabetes, etc.

- Reduced State-funded care, resulting in greater reliance and use of private care
- Provider behaviour – over-servicing policyholders, i.e. longer lengths of stay, more expensive procedures than strictly necessary
- Fraud – claims for services not rendered or procedures not performed, driving up costs
- Medication – more expensive/new medications coming on to the market
- Member awareness of benefit entitlement increasing
- Benefit richness having increased over time
 - E.g. limits increased
- Use-it-or-lose-it mentality among policyholders, driving up claims
- Changes in legislation around level of co-pays, limits, exclusions, etc.
- Changes to DSP's and/or funding of care through non-DSP's
- Increasing number of very high-cost cases, e.g. cancers, or organ transplants

Credit not awarded for points around pandemics/one-off events/bad flu season/random fluctuations as this is a trend over time.

(iii)

- Contract the services of a managed care organisation which can assist with:
 - Setting up DSP arrangements/networks
 - Treatment protocols for procedures/diagnoses
 - Formulary development (only cover generics or cheaper alternatives where these exist)
 - Disease management programmes, e.g. HIV, diabetes
 - Tariff agreements/negotiations with providers
 - Require pre-authorisation for medical procedures/treatments
 - High-cost case management to monitor appropriateness of care
- Increased underwriting
 - to identify pre-existing conditions and load premiums accordingly (if permitted)
- Reduce benefit limits
- Increase co-payments
- Charge higher premiums
- Implement fraud detection algorithms to flag unusual or suspicious claims
- Alternative reimbursement arrangements, e.g. capitation or global fees
- Increased policyholder education around and funding of preventative care
- Incentives for healthy behaviours and diets
- Reinsurer's assistance in pricing, benefit design
- Reinsurance to protect against high claims

QUESTION 7

Examiner comments: This was a difficult question covering matching strategies which are often poorly answered in exams. A long pre-ambles provided candidates with quite a few points to use in their response. Under part (i) many candidates stated this suggestion matched the liability by term, despite being told the term of the liability extended beyond the 10 years. For the most part, they did not recognise that the liability described is a nominal, not real liability. When considering the matching proposal, they failed to reconcile this to the valuation method and basis. Answers were generally far too short for the number of marks required. Part (ii) and (iii). A surprising number of candidates did not seem to know what immunising is, which made part (ii) and (iii) exceptionally difficult. Even just stating the bookwork on this method would have scored at least half the marks required. However, only the best prepared candidates managed to score a few marks here. Part (iv) was a challenging question and required candidates to think carefully about what good/performance would be in this setting. Most candidates failed to identify the liability/funding level as a benchmark against which to measure performance. Just stating definitions of MWRR and TWRR suggests no understanding of the scenario and scored poorly. Future candidates would do well to work through this question carefully.

(i)

Advantages

- Simplicity: It is quite simple to buy and hold a single bond.
 - Quite likely that no intermediary is required to execute the strategy
- The strategy matches the liability in both nature (nominal payments) and currency.
- Hedging: the 10-year bond should provide a reasonable hedge against interest rate moves since the same yield is used to discount the liability.
 - Hence the funding level should not change too much from year to year. (Unless there are significant interest rate changes).
- Low cost: since Major Metals is only buying and holding one bond, the investment costs would be low – limited to trading costs at the start and when liabilities become due, and custodian fees.
- Safety: Government bonds are typically low risk, especially if this developing country's debt is stable.
- Regulatory Compliance: The bond is issued by the country where the mine is located and should therefore be permissible.
- Liquidity: If the 10-year bond is the benchmark, it's likely the most liquid of the available options, making it easier to buy and sell or adjust if needed. This will be particularly useful as and when the liability payments become due.

Disadvantages

- Interest Rate Mismatch Risk: The liability's value is tied to the 10-year bond yield at each valuation date, which fluctuates.

- However, the duration of the liability will be higher than the duration of the 10-year bond (the asset)
- The rehabilitation costs stretch over 20 years (10 years of mine life, then 10 years of increasing payments)
- Whereas the bond pays smaller coupons and then a maturity value in 10 years.
- If 10-year yields drop after the bonds are bought, the liability's present value will increase by more than the market value of the asset, resulting in a potential deficit at future valuation rates.
- In addition, Major Metals might need to reinvest at lower rates, when the bond matures.
- Opportunity Cost: Tying up all the cash in bonds locks Major Metals out of potentially higher returns from other assets, like equities or inflation-linked securities, which could better match the escalating costs, should the estimates of the rehabilitation costs be too conservative.

(ii)

- LDI Inc.'s immunized strategy aims to shield the funding level from interest rate swings as described above
- This can be achieved since we have three bonds of increasing maturity to choose from.

The steps would be as follows:

- Calculate the present value of the estimate liability cash flows using the prescribed basis (the 10-year bond yield).
- Transfer assets (cash) into the portfolio such that: Market value of assets = present value of liability
- Calculate the Liability's Duration using the 10-year bond yield. This is expected to be in the 13-15 year region.
- Build a Bond Portfolio: Using the three bonds (5-year, 10-year, 20-year),
- Subject to the condition that the portfolio's duration matches the liability duration. For example:
 - The 10-year bond has a duration close to 10 years
 - The 20-year bond's duration might be 16-18 years.
 - The 5-year bond's duration is around 4-5 years. LDI would overweight the 20-year bond and blend in some 10-year and 5-year bonds to match the 13-15 year duration target
- Immunization Mechanics: The goal is to ensure that if interest rates shift, the portfolio's value moves in line with the liability's present value. This involves:
 - Matching Duration: So a small rate drop increases both asset and liability values by roughly the same percentage.
 - Convexity Adjustment: the convexity of the asset portfolio should be higher than the convexity of the liability.

- This involves Fine-tuning the mix to account for non-linear price changes in bonds, especially since the 20-year bond has higher convexity (sensitivity to rate changes).
- Rebalancing: As time passes and durations shift (e.g., the 20-year bond becomes a 15-year bond)
- LDI would need to rebalance the portfolio by selling and buying bonds to continue to meet the above conditions in terms of duration and convexity.

(iii)

- The strategy would need to be monitored and rebalanced on an ongoing basis (at least annually)
- This would introduce additional costs in terms of both asset management fees (for LDI) and trading fees
- The 5 and 20- year bonds are illiquid. This will make it more difficult to implement the hedge and to maintain it due to availability of bonds
- In addition, the rebalancing costs would be higher since spreads would be wider on these bonds
- Similarly, they may not be able to sell bonds as and when the liability cash flows fall due.
- Interest Rate Assumption: The strategy assumes small parallel yield curve shifts (which is quite unlikely).
 - If the curve twists (e.g., short rates rise, long rates fall), the duration match will no longer hold and a deficit (or surplus may arise) breaks, and the hedge fails.
- Model Risk: The actuary's discount rate (10-year yield) might not perfectly reflect the portfolio's yield, especially if it's heavy on 20-year bonds.
 - A small mismatch compounds over time.
- Regulatory Pressure: If the market value dips below the actuarial value at the annual check (say, due to a rate spike), Major Metals might need to top up the fund, stressing cash flow.

(iv)

- LDI will have been mandated to maintain a fully funded position between the assets and liabilities over time.
- Hence Major Metals could track the ratio of the portfolio's market value to the actuarial liability value at each annual review (or more frequently).
 - A ratio consistently at or above 100% shows LDI is successful at maintaining the hedge
 - Major Metals would need to consider (at the outset) an acceptable range for the funding level.
- Volatility of Funding Level: the hedge is not perfect and variation in the funding level is to be expected
 - Major Metals would need to consider (at the outset) an acceptable range for the funding level.

- Measure how much that actual funding level changes on a monthly or annual basis.
- Low volatility means LDI's immunization is working—shielding against rate changes.
- Cost Efficiency: Compare actual portfolio returns (after fees and trading costs) to the 10-year bond yield.
 - If LDI's strategy underperforms a plain-vanilla bond approach (as suggested by the FD) it may indicate a review of whether the hedging strategy is worth the costs.
- Rebalancing Effectiveness: Check how often and how well LDI adjusts the portfolio. Look at duration gaps (portfolio vs. liability) over time—small, stable gaps signal skill.
- Stress Testing: Ask LDI to simulate portfolio performance under scenarios like a 2% rate hike, a yield curve twist, or bond illiquidity spikes.
 - Compare those to liability impact to test robustness.

QUESTION 8

Examiner comments: Overall, the question was fairly answered, however, poor exam technique cost many candidates unnecessary marks in part (i). The question required eight key risks, but many did not clearly indicate what their eight risks were, or gave more than eight. Often risks were simply stated and not discussed in sufficient detail or applied to the specific scenario and failed to gain the full credit. Poor answer structure (lacking the planning and strategy required for long questions worth many marks) was common, and as a result candidates ran out of ideas or became too generic. Part (ii) was well-answered overall. Part (iii) was a straightforward calculation, but few scored well, not reading the workings of the charging structure carefully, losing unnecessary marks. Part (iv) scored reasonably well by those who did attempt it, but few picked up on the nuances that increasing premiums with age is appropriate given the increasing risk, but that the crude allowance may not be appropriate. Similar comments hold for inflation. Few identified the fact that there is no benefit inflation or fixed premium option which may be less appealing to customers.

(i)

Pricing risk

- New firm with no past experience to price product
- May underprice (resulting in losses)
- Or overprice (resulting in too low volumes)

Claims risk – Mortality

- Mortality experience may be higher than expected, resulting in losses
- Developing economy may be subject to poorer healthcare, higher mortality
- Anti-selective uptake due to no underwriting.

Expenses risk

- Expenses incurred may be higher than expected/priced for
- Especially start-up costs, marketing, systems development
- Expense inflation over time may be under-estimated

AI algorithms risk

- The AI application used may fail, e.g. incorrectly decline valid applications, or
- Approve applications with incomplete or false information
- Could take time to notice, after which time, the extent of the errors and binding contracts entered into may be very onerous

Data risk

- May not have any data available for pricing
- Data may be unavailable – new, untested market, or
- Very expensive to obtain, e.g. through reinsurers.

- Data may be outdated, erroneous, unreliable, not fit for purpose (e.g. census data)

Regulatory risk

- Risk of regulatory intervention/fines – conduct, solvency, etc.
- Use of AI models may become strictly regulated/disallowed
- Use/storage of personal information using AI for pricing/verification purposes may be subject to stringent regulations
- Future changes to regulation and continuing compliance with regulation may pose a significant risk

Reinsurance risk

- Reinsurance may be unavailable (unwilling to cover risks not underwritten/underwriting performed by AI models)
- Reinsurance may be very costly/unaffordable given the pricing/data/mortality risks outlined

Business volumes and mix

- Business volumes may be too low (not recouping start-up costs), or
- Too high given systems, capacity, capital, etc. resulting in regulatory intervention/insolvency
- Significant lapses if expectations/needs of customers not being met.
- Mix may be poor in terms of age of policyholders (mortality) or geographic spread (concentration) or size (if cross-subsidies exist)

Reputational risk

- Where AI models don't work as intended, resulting in inconvenience to policyholders
- Bugs in mobile application causing frustration for policyholders
- Poor customer service/claim turnaround times, spreading on social media
 - Reducing uptake or triggering large scale lapses

Anti-selection risk

- No physical medical tests, which may lead to a strong incentive for those in poorer health to take up this cover
- Similarly, selective lapsing or non-uptake by those in good health.

Cyber threats

- All information processed online, and can be subject to a hack or a leak or data base in the cloud being lost
- AI models existing on the cloud could be hacked, altered or deleted – intentionally or by accident causing a breakdown in service offering/availability
- Mobile application may not work as well as intended.

(ii)

- Peachy is not reliant on legacy systems and systems which are very complex to update
- Peachy should easily be able to adapt to changes in the market/regulation
- Online platform for obtaining insurance removes hassle for policyholders
- Platform appeals to younger, more tech-savvy population
- Likely to be in better health
- No brokers as in traditional insurance – no commission expense
- AI driven business model means lower number of staff likely to be required – fewer HR expenses and issues
- May be easier to scale if models can learn and become more efficient over time
- Insurance is bought by those who want cover, rather than sold (and possibly mis-sold) by brokers, potentially resulting in fewer lapses
- No underwriting means reduced costs for insurer/hassle for policyholder
- Being cloud-based means less physical storage space or property/offices are required, further cutting expenses
- Margins may be higher for this type of insurers if policyholders willing to pay relatively more for the convenience

(iii)

a. $1\% \times R1m \times (1.008)^{23} = R12\,011.36 \text{ p.a} \Rightarrow \text{Monthly premium} = R1,000.95.$

b. Answer in (a) $\times [(1.008)^{12}] \times [(1.045)^{12}] = R1,867.81 \text{ p.m.}$

(iv)

- Mortality risk increases with age,...
- ... hence charging premiums that increase with age are appropriate.
- Mortality risk does not generally increase linearly,...
- ...hence the compound nature of the increase is appropriate.
- It is unclear whether a constant compound rate of increase is appropriate...,
- ...and the proposed rate is likely too high at younger ages and too low at higher ages.
- Additionally, expenses are expected to increase with inflation over time, compounded...
- ...and allowing for the premium to increase with inflation compounded will help ensure that expenses can be recouped in future.
- The structure implies that level premiums are not an option which may be preferable to some potential customers.
- The structure also makes no mention of annual sum assured increases.

- Assuming SI stays level, but premium keeps increasing...
- ...which may not be very marketable in the long run.