EXAMINERS' REPORT

November 2021 examinations

Subject F101 — Health & Care Fellowship Principles

INTRODUCTION

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

QUESTION 1

Examiner's comment

This question was reasonably answered by most candidates. Candidates who did well were able to apply the full investment principle framework to the information provided for part (i). Part (ii) was a straightforward bookwork question.

(i)

- Currency
  - Liabilities denominated in local currency…
  - … International assets not neccessary
- Nature
  - Liabilities relate to annuities in payment….
  - …annuity payments indexed to inflation
  - …the claims are likely to be subject to material levels of medical inflation if product offers indemnity cover
  - Payment of liabilities starts immediately, so some need for cash investments to meet this outgo
  - Also expenses of paying annuities…
  - …suggesting also need cash on hand required to meet those expenses
  - No future inflows as single premium policy
- Term
  - Established book of business likely to have average term of around 10 years
  - Thus longer term assets should also be considered
- Uncertainty
  - Uncertain survival duration, so some longer-term investments also appropriate, given that they are sufficiently liquid to realise as and when required

- Fixed interest bonds offer security but do not match escalation
- Index linked bonds are best match for liabilities…
- …can also match annuity payment frequency
- …some allowance for equity and property investment, with some gilts as well, to generate real returns
- Also consider legislation and regulatory requirements, such as permissible assets, maximum allowable investments in certain asset classes etc.
- Note that the level of mismatching possible will be subject to free reserves

(ii)

- Admissible versus allowable assets
- restrictions on the type of assets that can be held or used to demonstrate solvency
- restrictions on exposure to single counterparties
- a requirement that certain assets are held e.g. government bonds

- restrictions on matching:
    - a requirement to match by currency
    - a limit on the extent of mismatching
    - requirement to hold a mismatching reserve
- restrictions on the valuation method or valuations assumptions used regarding the assets invested in
    - includes regulations around unrealized gains and losses
- restrictions/requirements on the custodianship of assets
- security classes such as derivatives may not be allowed
- custodianship of assets
- there may be regulations around the investment fees
- restrictions on international investments

QUESTION 2

Examiner's comment

Part (i) was surprisingly poorly answered. The question required candidates to identify the nature of mortality as a variable and then to describe the appropriate GLM and link function. Most candidates did not do this. Part (ii) was a straight bookwork question and was generally well answered. Part (iii) was also fairly well-answered. Reasonable (and generic) descriptions of model-fitting and testing were accepted.

(i)

- Logistic Regression
- Mortality is a binary outcome, logistic regression models such 0,1 outcomes well
- Link function: linear predictor, $\eta(x) = \ln(\mu / (1 - \mu))$
  …otherwise stated: $g(\mu) = \ln (\mu / (1 - \mu))$

(ii)

- Symmetrical about the x-axis
- Average residual of zero
- Are fairly consistent across width of the fitted values

(iii)

- Check which variables are statistically significant against a computer generated p-value threshold
- Calculate AIC values, F tests, Chi-Squared, or some other comparative measure
- Plot odds ratios, those with confidence intervals above 1 are statistically significant drivers
- Check which variables add to explanatory power of model with/without other variables present - effect on the statistical measure chosen
- Otherwise stated: Change in nested model deviance is significant
- for reasonable comment

QUESTION 3

Examiner's comment

This question was well-answered by most. Part (i) was bookwork, applied to the current-day scenario and those who knew the bookwork, could apply it well. Part (ii) was typically also well-answered. But candidates lost some marks by repeating points, or stating similar points instead of 8 distinct points. Some candidates did not follow the instructions by providing more than 8 points, and only the first 8 were considered. It is important that candidates clearly distinguish between points. Some candidates outlined challenges to the government in general, that did not relate to the roll-out of the vaccines which also resulted in some marks being lost.

i)

- Protecting the nation's health
    - Ensuring rapid, widespread access to vaccines, will ensure herd immunity is achieved sooner, minimising the further spread and toll of the virus
    - Fewer people will become ill, and mortality due to the virus will decrease

- Subsidising the poor
    - In order to achieve herd-immunity, it is vital that the poor also receive vaccines, despite being unable to afford them
    - Given that the country is developing, it suggests that there may be a large poor/vulnerable population that will require subsidising from the government to receive the vaccine
- Balancing the budget
    - Limited resources available
    - Cost of vaccines plus roll-out of plan vs opportunity cost associated with declining economy and poor health outcomes
    - Many demands on government budget – education, housing, infrastructure, etc. that need to be weighed up and still need to be provided despite the vaccine drive
- Making good on political promises
    - Part of the campaigning would have been promises to deliver services, provide healthcare, etc.
    - Need to make good on these in order to remain popular at following election
    - Indeed, there is also the expectation to take care of population in times of distress like this, which further necessitates the government to provide vaccines to the population

ii)

- Costs – purchasing the vaccines
- Logistics – freight/storage/distribution of vaccines to entire population
- Infrastructure – facilities to administer vaccines, personnel to do this – large scale – 1000's of distribution centres/qualified staff required

- Fraud, wastage and abuse – significant scope for fraud and inefficiencies in such a large operation – careful checks and balances required
- Willingness to take vaccine/Attitudes of general public – there may be widespread mistrust of the vaccines and an unwillingness to take them.
- Proper record keeping - Keeping track of who have received vaccines and who still needs and how many people per regions, per vaccine facility, etc. will prove very challenging given the scale of the operation
- Acquisition – limited supply; great demand; developing country may not have sufficient bargaining power to obtain sufficient number of vaccines
- Identifying and prioritising various segments of population for vaccination in order to ensure the most effective rollout – very challenging with limited data on the persons at greatest risk and where they are – where to send vaccines and when to ensure those needing them get them first
- Efficacy of the vaccine/mutations of virus – speed of rollout is key, and a big challenge with the threat of mutations rendering currently available vaccines less effective
- Private sector partnership and involvement – negotiations and contracting with private sector may significantly boost the speed and efficiency of the rollout, but these may not be so easy to put in place and get up and running quickly
- General mistrust of the government and their plans; inertia of the public to seek out and utilise vaccine drive when available, i.e. physically go and stand and queue and wait

QUESTION 4

Examiner's comments

The first part of the question was well answered although some candidates did not fully define the events that can trigger benefit payments.

The second part of the question was answered reasonably well, the stronger candidates used the information given in the question appropriately and this helped them to identify capital constraints, cultural impact and competitive landscape.

The last part of the question was not well answered, some candidates did not know how tax deductibility works. Candidates were also required to think more laterally to generate sufficient points discussing the impact of the tax change but this was not done well overall.

i) Pre-funded - purchased by relatively young people during their working years to access benefits after retirement or at disability.
Immediate needs plan - purchased by disabled or retired claimants to protect themselves against uncertain survival duration.
(*Marks awarded for mentioning the type and defining*)

ii) Pros:
- Diversified product portfolio - adding a new product may help diversify the company's product offering

    - Potentially beneficial from a risk management perspective
- Contribution to overhead costs - as volumes of products sold increase,
- Long-term investments scope for higher returns therefore scope for higher profits for the company if investments are well managed
- More wholistic offering to enhance marketability
    - Improves sales potential for the sales team
- Could be some tax benefits for policyholder and company.

Cons:

- Poor sales – insufficient sales volumes to recoup incurred upfront costs leading to higher losses than expected
    - family culture in middle east such that this kind of product has no wide appeal
- too expensive for policyholders, difficult to sell, as is the case in more developed markets
- significant development costs leading to new business strain that the company may not be able to fund
- prohibitive legislative environment making it expensive to launch and administer this product
- difficult to price a new product and thus an acceptable uncertainty of future results
    - longevity risk is a key assumption that is difficult to determine in a immature market
- uncertainty about the company's ability to manage administration expenses efficiently over time
- Significant Investment risk given the time delay in receiving premiums and paying claims over a long period

iii)

- If this new regime is more beneficial to policyholders it will be more attractive to them,
    - They will pay less for the same benefit compared to the old regime,
    - This is more tax efficient for them

    - Compare with existing tax regulations and illustrate the benefits of the new regime for the policyholder

    - Compare with treatment of other products now and under new regime

- The regime change opens new opportunities as this product that could be more attractive to policyholders as package including other products,
    - opportunity to partner with other companies that offer complementary products such pension funds

    - A medium sized health insurer is unlikely to have investment capabilities and it this new regime may create an opportunity to partner with investment houses
- Consider opportunities this creates for employer groups
    - This creates an opportunity for employers to structure their benefit packages more innovatively by including tax efficient long-term care benefits
- Improved sales prospects also lead to an improvement in the business case for launching this product
    - Improves the internal rate of return of this project
    - This will make it easier to justify making capital available to absorb the new business strain
    - Possible to include higher profit margins as this will not inflate the premiums significantly given the tax benefit
    - Possibility of earning higher returns on investments improve profitability of this product
- Reinsurers may be more willing to assist with the pricing now given the improved prospects
- The sales team will be happy to have an offering that is now more marketable. (*many other points can be considered so this list is not exhaustive*)

QUESTION 5

Examiner's comments

Performance was mixed on this question. Easy marks were lost on bookwork components by some candidates. For part (i) some candidates discussed analyses that did not pertain to profile (demographics). Marks were lost where candidates merely "listed" factors instead of outlining analyses. For part (ii) generic answers such as "check benefit levels" or "check comprehensiveness of benefits" were not awarded marks, as the question asked candidates to outline the specific nature of how benefits could differ between insurers. Part (iii) required candidates to explain how one would conduct hospital claims analyses. Candidates that structured their analyses generally scored higher marks. For part (iv) some candidates outlined the aims of managed care, whereas the question asked for 'services' that a managed care company could offer with regards to hospital benefit management. Answers that did not specifically relate to hospital management, or provided generic managed care services that were not tailored to the question, were not awarded marks. For part (v) candidates that knew their bookwork performed well. For (vi)the link between chronic disease management and downstream hospital costs had to be made for full marks

i.

Age

Perform an analysis on the change in the average age over the last 3 years

- If the average age has increased (and notably the pensioner ratio too), it would be driving higher claims ratios as healthcare claims generally increase with age.

Chronic Ratio
Perform an analysis on the change in the chronic burden over the last 3 years

- If the percentage of lives suffering from chronic ailments (such as diabetes and hypertension) has increased, it would be driving higher claims ratios as healthcare claims generally increase with the morbidity burden of lives.

Industry
Perform an analysis on the change in the industry segments of the book

- If the percentages of lives in industries that are more dangerous (eg police force) or unhealthy (eg sedentary office workers) have increased relative to other occupations, it would also lead to more healthcare outgo over the years, all else equal.

Marks awarded for other valid healthcare status analyses such as "smoker status", "obesity", etc inclusive of an outline of why it would increase claims ratios. Other valid examples (eg gender) will also attract a mark, if motivated adequately.

ii. Main benefit comparisons would include:

<u>In-Hospital</u>

- Types of admissions covered
- Overall rand amount limits for hospitalisations
- Co-pay amounts
- Exclusions

<u>Out-of-Hospital</u>

- Chronic Medication *(max 1)*
- number of chronic conditions covered
- overall rand amount for chronic cover

- Acute Medication *(max 1)*
- rand amount for acute medication cover
- over-the-counter rand limits

- GP visits *(max 1)*
- rand amounts limit per GP visit
- including overall limit (number of visits or rand total)

- Specialist visits *(max 1)*
- rand amounts limit per specialist visit
- including overall limit (number of visits or rand total)

iii. You could break up the hospital costs as follows:

Hospital cost = admission rate * length of stay (LOS) * cost per day.

Analysing the change in the **admission rate** will show if more people have been admitted for certain admission categories over time. A higher overall admission rate will imply higher hospital costs. .

Analysing the **length of stay** will show if patients stay longer in hospital over time. If this is the case, it will also place further pressure on hospital cost increases.

The **cost per day** metric will be very useful to see how large the increase in unit costs (eg ward fees) were relative to CPI. If the annualised cost per day increases are high, it would also increase the overall hospital outgo.

This could be performed by **major admission category** for each of the three years so you can look at the change in costs for each admission category.

This could also be done by **province/major hospital group** etc to see if a certain area has a proportionally higher increase than other areas.

Additional valid analyses will also attracted marks if motivated

iv. Managed care services that QuickCare could offer MedCo to assist with its hospital benefit management include:

- Pre-authorisation management
- High cost case management
- Discharge planning and/or Alternatives to hospitalisation
    - Including palliative and wound care
- Hospital protocols (eg what criteria is needed for an admission; in what setting should care be provided, eg day hospital/acute hospital)
- Outlier management (ie identifying inefficient hospitals)
- Hospital Network management, ie identifiying and maintaining an efficient and cost effective hospital network
- Hospital 'take-home medication' management
- Clinical audits, ie retrospective reviews

v. Alternative reimbursements to consider in the hospital setting include:

Per diem arrangement

- A set rate is agreed per day (i.e. per diem) for all services provided by the hospital.
- The per diem structure may be split into types of admissions, for example, general admissions, surgical admissions, maternity etc.
- The per diem rate may be structured to allow for a higher reimbursement rate for the first 1or 2 days of a hospital admission as the costs associated with surgical and maternity cases are higher in the first few days.

- In certain instances complicated cases will be "carved out" of the per diem arrangements and will be charged on a fee-for-service basis. (This protects the hospital in terms of extraordinary high cost cases and assists the scheme in obtaining better rates where the possibility of high cost cases has not been factored into the per diem rate.)

(The per diem structure reduces the hospital's incentive to over-service the patient and encourages the hospital to improve its profitability by managing its cost efficiencies.)

The main risks transferred by the funder are price risk & intensity risk.

Intensity risk: the funder bears the risk that more services are needed around the bed than expected. Negotiating a fixed rate per day that the patient stays in hospital (irrespective of treatments received) will transfer this risk from the funder to the provider.

(Incidence risk for insurer remains – more cases than expected.)

There is an incentive for hospitals to delay discharging patients to earn higher fees.

This risk could be managed by:

- matching the per diem payments more closely with hospital costs (eg higher amount for first day for surgical admissions) and
- focussing on discharge planning so that the insurer monitors that patients are discharged at the appropriate time.

Fixed fee/per case/global fee arrangements

- Hospitals are paid a fixed amount per admission
- Fixed fee amounts may be differentiated by medical speciality, eg orthopaedic or neurology.
- Fixed fee reimbursement may be combined with per diems, where per-diems are used for more common treatments and per-case amount for unusual cases

The main risks transferred for the funder are price risk, intensity risk and severity risk.

Severity risk – If the condition of a patient is more severe than anticipated, the funder will need to bear the cost of additional treatment.

Negotiating a global fee for certain conditions or procedures (irrespective of the severity or recovery period) will transfer this risk from the funder to the provider.

There is an incentive for the hospital to discharge the patient and then re-admit the patient to earn more fees.

This can be managed by linking related admissions together.

Not likely that hospital will want to take on full risk for profile, e.g. capitation arrangements would not likely be considered in the hospital setting.

vi.

On a disease management programme, all registered members with a chronic disease (eg diabetes) are actively monitored.
It is more cost effective for chronic sufferers to manage their condition out of hospital in order to avoid a hospitalisation event, which is generally expensive.
I.e. Short term increases in out-of-hospital costs such as medicines, pathology tests and GPs visits would result in savings in the aggregate given the large and volatile costs related to hospital admissions for poorly managed chronic conditions.

Enrollees can be for flagged for poor disease management (eg poor HbA1c results).
These members can be contacted by the managed care provider, education on their disease provided, a support line given as well as reminders sent to them.
Enhanced predictive modelling can then also be applied for stratification purposes and claims projection purposes.

QUESTION 6

Examiner's comments

This question included some calculation questions in the sub parts. Candidates who performed well overall on this question were able to do well with the calculations required in parts (ii) and (v). Candidates who struggled with part (i) were unable to apply the results more broadly and instead focused their answer solely around margins. Part (iii) and (iv) were both bookwork questions.

(i)

- Collect data from other sources to estimate costs…
- …for example from professional/governmental bodies, other countries, reinsurers
- …will need to adjust to be relevant to the market the product is in
- Ensure clear definitions of illnesses used and specified…
- Consider implementing benefit caps to limit claims per case…
- …which will limit maximum liability
- …offer cash benefits and not indemnity
- Benchmark premiums against competitors with similar products in the market
- Build in margins to pricing and reserving…
- …should be commensurate with the level of uncertainty
- Avoid offering guarantees

- Consider reinsurance that can help limit the retained risk
- Ensure adequate capital reserves set aside…
- …beyond any minimum solvency requirements
- Frequent experience review to compare how experience is actually emerging compared to expected…
- Consider if premium reviews can be done more regularly
- Ensure adequate underwriting is in place
- Validate claims before they are paid… or consider claims preauthorization

(ii)

incidence rate = 0.00953 + 0.00640 + 0.01020 + 0.00584 – 0.05 * 0.00640 = 0.03165

incidence rate after survival period = (1-0.0141) * 0.03165 = 0.031204

expected claims cost = 0.031204 * 542,700,000 = 16,934,267 or 16.9 million

(iii)

1. Profit loading
2. Administration expense loading
3. Loading for commission and marketing expense
4. Reinsurance loading
5. Solvency capital requirement loading
6. Contingency margin
7. Loading for investment fees and costs
8. Other expenses such as consultant fees and legal fees

(iv)

Accelerated critical illness is where the benefit is paid on the sooner of death or illness whereas stand-alone critical illness does not pay on death and only pays on illness.

(v)

Incidence rate (accelerate CI) = 0.03165 + 0.62 * 0.0082 = 0.036734

Incidence rate (accelerate CI) after survival period = (1-0.0141) * 0.036734 = 0.0362161

Expected claims cost = 0.0362161 * 542,700,000 = 19,654,451 or 19.7 million

Expected premium income = 19,654,451/(1-0.115) = 22,208,419.21 or 22.2 million

Premium per life per month = 22,208,419.21/20,000/12 = 92.54

QUESTION 7

Examiner's comments

This question tested knowledge and application on the topics of products - private medical insurance and critical illness cover specifically, distribution as well as the nature of group and individual business.

Part (i) was a bookwork question asking candidates to provide a list about why employers would offer this cover. The question was well answered with candidates giving sufficiently many points for the relatively large mark allocation.

Part (ii) asked candidates to explain the benefits of combining the PMI and CI products. Candidates handled this question very well, with better candidates being able to explain the combination regarding benefits, premiums, expenses and marketability.

Part (iii) tested principles about the distribution channel for these products and required candidates to apply their knowledge about independent intermediaries in this context - employer, industry and size of client. Better candidates used this information to discuss the appropriateness of independent intermediaries. Some candidates considered the viability of other channels in addition. Again, this was well answered by candidates.

Part (iv) asked candidates to unpack the actuarial and business implications of entering the individual market from the current business model of providing insurance to groups. Candidates were expected to outline these differences in detail and cover a wide range of factors given the mark allocation. Strong candidates did well in this question.

(i)

- Group PMI and CI will be seen as a valuable benefit by staff and can be used by an employer as part of the overall benefits package to attract and retain staff
- As these employers operate in industries with higher than normal risks in terms of health and safety, they may want to ensure that their staff have adequate protection and that they manage their risks accordingly
- Both products can promote health and wellbeing in the workplace
- PMI can help to ensure acute medical conditions are treated promptly and assist with a speedy return to work following a medical need
- PMI may improve the quality of treatment, making employees more satisfied and productive in the long term
- CI can assist to finance time off work for critical illnesses where extended time is required to recover from an illness or procedure
- Employers can assist those who may not ordinarily be able to access this cover on their own (e.g. some blue-collar occupations) to have it available
- It could be a legal requirement for employers to provide such insurance to their staff

- Group cover may have tax advantages over individual insurance cover, depending on the territory
- The employer can offer the benefit that has a greater perceived value to the employee than its cost to the employer (because of more favourable group underwriting and pricing).
- The employer can pay the whole premium on behalf of the employees which could / be a significant employee benefit and assist to attract and retain staff
- The employer could share the cost with the employee or facilitate premium collection, both of which offer the employee a benefit, even if only administrative

(ii)

- The PMI product is usually an indemnity product while the CI product usually pays a fixed amount on the diagnosis of specifically defined critical illnesses
- The PMI product may not cover all critical illnesses therefore the combined product may offer the policyholder greater financial protection against a wider range of illnesses or conditions
- By combining these products the policyholder has more certainty of cover over costs to diagnose and treat the condition as well as longer term costs associated with living with or recovering from the condition
- The policyholder may receive the CI benefit on diagnosis giving more flexibility on how to use the money, such as for costs not covered by the PMI policy
- As competitors increase the range of conditions they will cover under CI, or widen their illness definitions to reduce the number of declined claims, a combined policy can reduce overlap between benefits and result in a more favourable overall premium.
- Policyholders can make one claim rather than two or more claims on multiple policies, simplifying the claiming process for them

(iii)

- Insurance intermediaries are independent of the insurance company
- Which means that they may move the client to another insurer if there is a better product / price available in the market
- Intermediaries are usually remunerated by commission from insurer or fee from client
- Which may influence the business being retained if the insurer pays a fair commission and has a good relationship with the broker
- Long standing relationship indicates that broker understands clients needs and can assist the insurer to manage the service delivery to the client
- The brokers may have a good understanding of the industries in which the clients operate and thus assist to support the business
- Brokers may be able to bring new business in the same sectors to the insurer
- Broker able to deal with complicated products which can serve as a useful service to the client and again improve the client experience
- The brokers may be specialists in the PMI / CI markets which can assist with better service delivery and the overall client experience

- As the intermediaries are independent, they can offer the client market comparisons, which may prompt the client to move to another insurer if a better deal can be secured
- The exclusivity of dealing with independent advisors means that the insurer can invest in a single distribution channel and standardize its processes accordingly to keep costs lower,
- Or the insurer can customize their service for each broker given the nature of the brokers and client base to enhance client experience
- The insurer may want to explore the cost benefits of using tied agents and assess which clients this market may offer and whether this would add value to the business
- Direct marketing may be less popular among group arrangements as employers may prefer to deal with a broker who can handle much of the admin for them, however there may be a market who prefer to deal directly and save costs (commissions) by doing so

(iv)

- The available market for the insurer to sell to expands, however the insurer will need to determine who is considered to be in their individual target market
- And whether or not it is confined to those working in the sectors of their group clients
- The insurer could decide to limit eligibility for the individual cover to those employees who leave the employment of their group clients for the purposes of continuity of cover (and client retention) and thus retain similar products
- However they may consider a broader target market which would be a significant shift from their current business model
- The insurer may want to consider different policy designs to cater for the needs of their individual client target market
- This could lead to a wider range of products and introduce some (more) complexity into the product design and management cycle
- The insurer will need to price the individual products separately, and may need to or decide to use different rating factors
- The pricing would need to reflect differences in risk profile and potential anti-selection of individual policyholders, however be competitive relative to the group contract so that it is marketable
- As individuals would be free to choose their own cover underwriting will be different as all individual policies will need to be underwritten…
- With more extensive underwriting where the sum at risk is large
- This would apply to financial and/or medical underwriting depending on the type of policy issued
- The insurer would need to review their distribution channels to account for how individuals would want to purchase the products.
- This may be a variety of channels such as direct and tied agents which would be linked with how the products would be marketed
- The administration (policy issuance, claims management, etc) associated with issuing policies will increase as each individual policyholder will own their separate policies
- The insurer would need to consider reinsurance arrangements for the individual products and how this may affect their current reinsurance arrangements