

# **EXAMINERS' REPORT**

*June 2012 examinations*

## **Subject F101 — *Health & Care* Fellowship Principles**

### **INTRODUCTION**

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

## QUESTION 1

i.

- likely to seek treatment in private facilities so cost of treatment
- loss of income while sick depending on sick leave requirements
- loss of future earnings/capacity to earn for more serious events
- cost of servicing debt
- lifestyle adjustment costs
- other contingencies such as child care
- custodial care in old age

ii.

- PMI cover for medical expenses, indemnity, usually annually renewable
  - a. Traditional non-profit cover
  - b. Indemnity means inflation proofed
- Critical illness cover for major health events, can be sold on long-term basis, lump sum product – can be used to cover loss of earnings/cost of servicing debt/lifestyle adjustments etc.
  - c. Traditional or unit-linked basis
  - d. Unit linking can make more attractive – surrender/maturity value
  - e. May have indexation of premiums and cover
- Short-term stated-benefit cover, e.g. per day in hospital, to cover contingencies or direct costs of treatment
  - f. Cover likely to be non-profit
  - g. Stated benefit therefore not inflation proofed
- Long-term care cover to cover custodial care in old age
  - h. Can be unit linked
  - i. Can be structured as an indemnity product or a stated-benefit product

iii.

- Shareholders
- Staff of insurer (e.g. marketing, underwriting)
- Regulator
- Distributors
- Professional organizations (e.g. actuarial society, chartered accountants)
- Auditors
- Medical providers (e.g. doctors, hospitals)
- The State
- Employers wanting to provide benefits for their employees
- Reinsurers

iv. Conflicting desires exist between the following parties:

1. Shareholders who want maximum profits from a new product  
vs  
Staff who want to personally benefit from the success of a new product  
Regulator who will want to see that customers are being fairly treated and that the product meets the legal standards set by them and that customers are getting a good deal  
Distributors who will want a cheap product so that they can sell it easily but also maximum commission possible

Auditors who will ensure the business is reported financially correctly for the whole life time of the business

Medical providers who want generous benefits (for PMI products)

2. Distributor who wants cheap product & high commission  
vs

Regulator who wants to ensure sales practices are fair and ethical and customers are treated fairly

3. Staff, regulators and the State who want to see the long term success of the organization  
vs

Shareholders who may only be in it for a short term gain

4. The State will be concerned about vulnerable members of society

vs

Shareholders who want to minimise risk associated with the product

(other meaningful examples also credited)

## QUESTION 2

i.

- Risk of making a loss if expenses are not recouped
- Can increase premium to cover initial expenses – risk here is that the premium is uncompetitive
- This may result in lower volumes which would increase the risk of the insurer not meeting fixed expenses and may result in the business being unsustainable
- Increase capital requirements if there are negative cashflows in the first month. This increases the cost of capital which places further upward pressure on premiums.
- Risk of higher volumes than expected, increasing capital strain. With less initial underwriting there would be a risk that there is a large volume of poor quality business. High initial costs may point to high levels of initial commission, this would further increase the risk of high volumes of poor quality business.
- Renewals will assist with offsetting high initial expenses – exposed to the risk that renewals are lower than expected.

ii.

- Accurate assessment of risk, which in turn enables setting of appropriate terms (e.g. higher premiums, lower benefits or exclusions)
- Appropriate allocation to rating cells – ensure pricing is fair
- Exclude risks that are too high to be priced for
- Reduce the risk of anti-selection
- Ensure that pool of risks taken on is commensurate with pricing
- Note that overinsurance is meaningless in the context of PMI

iii.

- Revisit expense analysis – split initial expenses into components, analyse underwriting costs (e.g. expensive tests, staff time)
- Consider alternatives e.g. moratorium underwriting
- Analyse the current proportion of policies that renew, by policyholder characteristics and distribution channel. Model expected renewals and the potential for recouping initial expenses over multiple periods.

- Analyse the split between individual and group business – initial expenses may differ between the two as well as the probability of renewal.
- Analyse whether expenses are accurately reflected in current pricing, allowing for expected renewals and capital requirements. Sensitivity test impact of variations in volumes of business and persistency.
- Model the impact of reducing underwriting on claims experience (incl potential anti-selection) . Model individual and group business separately as underwriting will differ.

### QUESTION 3

i.

- National cancer registry
  - Insurer will be interested in incidence rates and not just prevalence
  - Need to be aware of difference between national population and insured population
  - Data may be out of date
  - Will be interested in different types of cancer as well as data by gender and age – detail may not be available
- Reinsurer data
  - Comes at a cost
  - Other insurer definitions/products may differ and there may be differences between countries/regions
- Industry data
  - Heterogeneity
  - Represents average of industry
  - May be useful for trends
- Medical research
  - Useful to identify recent changes in diagnostic technology and incidence
- Oncologists association
  - Particular useful to identify whether there have been changes in diagnostic technology and diagnosis definitions
- Own data – cheap, available, recent.
  - Anomalies compared to national figures/reinsurer figures may indicate anti-selection or flawed underwriting process.

ii.

- Accelerator, rider or stand-alone benefit
- May be a traditional non-profit product, indexed premiums/benefit or unit-linked
- Tiered benefits –variations in whether benefits are tiered or not, the number of tiers and the differentials in sum assured.
- Whether multiple reinstatements are permitted or not
- Variations in number of diseases covered
- Cover terminating at different ages
- Variations in definitions of diagnoses
- Variations in deferred period
- Speciality benefits – women only, children’s benefit add-on, TPD/terminal benefit

iii.

- Would need to consider whether current product meets consumer needs, and if not what changes would be necessary

- Current volume of business sold and what impact a product design change is likely to have
- The simplicity of product design and possibly complexity that would be introduced if more diseases were covered, benefit was tiered etc.
- Risk of lapse and re-entry
- System changes required for a more complex product, for example, if product was made unit linked
- Reinsurer assistance available to price new design
- Size of critical illness premium relative to death cover
- Competitor products – whether changes need to be made to enhance competitiveness, ease of comparison between products
- Underwriting – cost and complexity
- Profitability – profit per policy, volumes sold
- Trade offs between competitiveness, marketability and profitability
- Distribution channel – how price sensitive the market is, openness to changes, impact on commissions, impact on ease of sale
- Regulation/Tax implications of changes (e.g. treating customers fairly)

## QUESTION 4

i.

- Need to consider data sources or what table used for morbidity assumptions, and any adjustments required
- Need mortality assumptions to estimate length of time that benefits are paid for
- Will need to consider impact of inflation if indemnity benefits are provided
- Will need to consider how reinstatements are dealt with
- Will need to allow for deferred period as well as any limits on cover
- If cover integrates with other cover (E.g. state) will need to allow for this
- Will need to consider the charge levels for different levels of care and types of care
- Utilization and charges for nursing homes/home healthcare services vary significantly by region
- Policy options and benefit triggers will impact on pricing
- The richer the plan design/policy options, the great potential for anti-selection
- Need to consider the impact of selective withdrawals on claims experience
- Will need to differentiate rates by sex (female claims are higher than men)
- Will need to differentiate rates by age (costs increase by age)
- Will need to differentiate rates by marital status (e.g. morbidity lower at younger ages for married people/spouse takes care of care needs)
- Need to consider morbidity changes over time
- Underwriting, marketing and claim administration will impact on morbidity experience
- Expected reinsurance recoveries will relate to morbidity experience

ii.

Assume claims paid in middle of year and premiums paid at beginning of year.

(Equivalent points are given to candidates if they assumed beginning or end of year claims and premiums payment.)

2006 Incurred Year Loss Ratio = PV (Claims incurred in 2006) / PV (2006 premiums)

PV (Claims incurred in 2006) =  $9,000/(1.045^{0.5}) + 6,000/(1.045^{1.5}) + 1,000/(1.045^{2.5}) = R 15,317$

PV 2006 Premiums = R24,000

2006 Incurred Year Loss Ratio =  $15,317 / 24,000 = 63.8\%$

2007 Incurred Year Loss ratio:

PV (Claims incurred in 2007) =  $20,000 / (1.045^{0.5}) + 10,000/(1.045^{1.5}) + 5,000/(1.045^{2.5}) + 1,500/(1.045^{3.5}) = R34,691$

2007 Incurred Year Loss Ratio =  $34,691 / 39,000 = 89\%$

2008 Incurred Year Loss ratio =  $26,033 / 35,000 = 74.4\%$

Total Incurred Claims (on 2008 basis) = 2006 Claims x  $(1.045^2)$  + 2007 Claims x  $(1.045)$  + 2008 Claims

=  $15,317 \times (1.045^2) + 34,691 \times (1.045) + 26,033 = R79,011$

Total Incurred Prem (2008 Basis) = 06 Prem x  $(1.045^2)$  + 07 Prem x  $(1.045)$  + 08 Prem

=  $24,000 \times (1.045^2) + 39,000 \times (1.045) + 35,000 = R101,964$

Total Incurred Year Loss Ratio =  $79,011 / 101,964 = 77.5\%$

Total Loss Ratio (77.5%) is slightly lower than Target Loss Ratio of 80%.

We see that results vary from year to year with 2007 LR of 89% being higher than Target Loss Ratio.

In addition, data may not be fully credible.

I would not recommend a rate decrease for 2011 for these reasons.

## QUESTION 5

(a) More claims than expected in most categories (more colds and flu, more serious cases of things like pneumonia, more accidents and winter sport injuries). Worsening, permanent.

(b) Lower wages but also business interruption costs. Impact of these is permanent. Delays in claim settlement and premium receipt are temporary.

(c) Temporary worsening cashflow as premiums flowing through this bank are delayed but billed income in income statement. Similarly temporary improvement in cashflow as claims flowing through this bank are delayed but incurred claims in income statement.

(d) Claims for this group received faster, hence hospital claims appear higher. Temporary worsening until estimates adjusted.

## QUESTION 6

i.

- a. Failure of a number of ADLs (explanation of ADLS and examples) -

Overriding mental illness

The advantage of ADLs is that they can be used to identify those people in need of long-term care.

However, an appropriate assessment tool will be required and people will need to be trained to apply it. May thus be more expensive to implement and less objective.

May cause delays in rolling out the benefit if not enough staff to do assessment.

Difficult to check results and thus more scope for fraud.

- b. A means test

The advantage of a means test is that benefits can be directed to the most financially needy members of the population.

Will also need to consider how eligibility for other state benefits is assessed – most likely to also be a means test and may thus be relatively easy to integrate

Cross-subsidisation of the poor

Total cost lower than providing benefit to everyone

Disadvantage: difficulties associated with considering income of the elderly – need to also consider accumulated wealth

Benefit is paid to the household so need to consider income of the household

Further disadvantages: disincentive to accumulate wealth, may be humiliating to have to prove that you are poor enough to get benefit. Disincentive for self provision.

May be perceived as unfair by taxpayers

Choice will depend on whether it is considered more important to direct benefits to financially needy or clinically needy.

ii.

- Government will be exposed to the risk of increased longevity (more lives surviving to old age, and paying benefits out for longer)
- Exposed to the (political) risk that the benefit paid out is inadequate to meet needs
- Risk of political pressure/competing needs to provide other benefits
- Risk of fraud
- Risk of higher than expected operational costs
- Risk that more people are eligible than anticipated
- Risk of insufficient nurses to provide home based care
- Risk that grants are not used for intended purpose
- Expenses and logistics worse than expected

## QUESTION 7

i.

All three benefit structures allow for the following:

- Settle debt e.g. pay off mortgage
- Also enables change in lifestyle e.g. shorter working hours
- Cover medical costs not covered by PMI e.g. experimental treatment
- Allow for a loss of income

- Cover other contingent costs
- Accelerated benefit enables you to settle debt before death, simplifies estate
- Flexibility of using up money prior to death if dependents don't need it or leaving money as part of the estate. Different needs at different life stages Cheaper than having a rider benefit.
- Stand alone benefit is useful for those who don't have dependents – not in need of life cover
- Rider benefits allows you to meet needs arising from diagnosis as well as needs arising on death

ii. Lives aged 47 next require independent rate for age 46.5 exact.

For accelerated critical illness, claim rate =  $ix + (1-kx)qx$

Age 46:

Dependant rate =  $3.1 + (1-0.52) * 1.2 = 3.676$

Independent rate =  $3.676 * (1-0.05 * 0.5) = 3.5841$

Age 47:

Dependant rate =  $3.3 + (1-0.53) * 1.3 = 3.911$

Independent rate =  $3.911 * (1-0.05 * 0.5) = 3.813225$

Expected cost =  $(3.5841 + 3.812335) / 2 * 720\ 000 = 2\ 663\ 037$

iii. Include claims where the first of either death or critical illness occurred in 2011.

i.e.  $520\ 000 + 350\ 000 + 710\ 000 = 1\ 580\ 000$

So Actual/expected = 59.3%

It does not provide a good idea of profitability, need to allow for:

- IBNR
- Fixed expenses
- Variable expenses
- Margins for solvency

iv. For stand alone critical illness contracts, the rate is  $ix * \text{probability of survival for 28 days}$

Age 46:

Dependant rate =  $3.1 * (1-0.12) = 2.728$

Independent rate =  $2.728 * (1-0.05 * 0.5) = 2.6598$

Age 47:

Dependant rate =  $3.3 * (1-0.15) = 2.805$

Independent rate =  $2.805 * (1-0.05 * 0.5) = 2.734875$

So age 47 next rate = 2.6973

Expected claim cost =  $2.6973 * 720\ 000 = 1\ 942\ 083$

Actual claims to include: 520 000

Actual/Expected = 27%

So much better result for stand alone CI.

## END OF EXAMINERS' REPORT