Institute of Actuaries of India

Subject ST1 – Health and Care Insurance
Specialist Technical

November 2010 Examinations

INDICATIVE SOLUTIONS

Introduction

The indicative solution has been written by the Examiners with the aim of helping candidates. The solutions given are only indicative. It is realized that there could be other points as valid answers and examiner have given credit for any alternative approach or interpretation which they consider to be reasonable.

Q1)

a) Benefits

- Emergency medical expenses while you travel/stay abroad arising as a result of accident or sickness covering
  - Physician fees
  - In patient costs such as accommodation/private room, nursing care, operating theatre, diagnostic procedures, surgical dressings, drugs etc.
  - Ambulance costs
  - Dental expenses following an accident
- Medical emergency assistance such as guidance on
  - the location of the hospital/physician
  - first-aid
- Medical evacuation and repatriation

b) Exclusions

- Any medical expenses incurred directly or indirectly as a result of
  - Traveling against the advice of a physician
  - Traveling for medical treatment
  - Pre-existing ailments and complications arising out of them
  - Suicide or attempted suicide
  - Self inflicted injury
  - War
  - Terrorism
  - Illegal acts
  - Dangerous sports

[4]

Q2)

a) Customer needs met by CI

- Income can be provided from the lump sum via an annuity when the individual cannot work as a result of his critical illness
- The benefit can be designed to repay a mortgage or other loan when the policyholder's health is in question following diagnosis of a critical illness
- Medical costs can be funded when the critical illness requires surgery or other expensive treatment
- Business partners can purchase CI policies on the lives of each other such that the benefits will fund the buyout of the stake in the partnership when critical illness arises
- A change of lifestyle can be funded where necessary to improve the claimant's health; for example, moving to a less stressful (and lower-paid) job following a heart attack
- Other needs suggested include recuperation after illness, taxation planning, medical aids (for example, the installation of specialist equipment in the home to enable the claimant to remain in his/her house)

b) Stand-alone vs. accelerated CI

- Both contracts provide lump sum benefits and not indemnify the policyholder

- Stand alone
  - Provided as a stand-alone insurance contract
  - Sum assured paid only on the diagnosis of an insured condition
  - Survival period applies - a critical illness claim that satisfies the listed conditions in the policy, will only be paid if the insured survives a period of time from the date of diagnosis of the condition
  - Following payment of a critical illness benefit, the policy terminates
  - Typically no payment is made on death; Occasionally such policies may offer a nominal sum in the event of death before a critical illness is suffered

- Accelerated CI
  - Provided as an additional feature of a term insurance policy
  - Sum assured paid on the diagnosis of an insured critical illness or death, whichever event occurs first
  - If the insured suffers a critical illness then the sum insured is paid and the policy is terminated, ie. payment of benefit is 'accelerated' forward from payment on death

- Some policies accelerate a portion of the sum assured in which case the contract stays in force and pays the balance sum insured upon subsequent death
- Most policies accelerate 100% of the sum insured in which case no survival period applies

c) Underwriting – stand-alone vs. accelerated CI

- Both are protection contracts – the insurer must be on guard against anti-selection and non-disclosure through its initial and claim underwriting

- Since the contracts provide cash rather than indemnity benefits, financial underwriting to check any attempt to over-insure is critical

- The target market for stand-alone contracts is likely to be more financially sophisticated (medically aware) than that for accelerated ones and thus arguably greater scope for anti-selection. The initial medical underwriting has to factor this in and may have to be more stringent

- Underwriter for a stand-alone contract will need to consider not only the likelihood of the insured contracting one of the critical illnesses listed in the policy but all the longevity following the diagnosis given his current health conditions in making the underwriting decision

- In the event of a critical illness claim, it is required under both the types contract to collect information about the medical events surrounding the illness to verify any material non-disclosure, the results of tests that show whether or not the insured event has occurred and it is not as a result of the pre-existing conditions excluded

- Additionally, the claim underwriting under a stand alone contract will need to verify that the insured has survived to the 'survival period' from the date of diagnosis of the illness. So, the verification of the 'date of diagnosis' and the 'date of death' is more critical in the case of stand-alone contracts

- In the case of accelerated contracts with only a small portion of the death benefit is accelerated, the underwriting can be very similar to that of a term life contract with a simple health questionnaire obtained on the family history of any critical illnesses covered under the contract

d) Actual vs. expected claim ratio – stand alone vs. accelerated

- Expected claims under stand-alone contract relative to accelerated one – lower
  - certain CI claims not admitted due to the survival period requirement
  - no benefit payable on death

- A/E ratio under stand-alone contract relative to accelerated one – it depends!

- If all claims were valid CI claims, then they will all be admitted under both the contracts and so there is will be no difference – in this case, the A/E ratio will be higher – the claim experience would have been worse

- If the death claims outgo were greater than expected and CI claims outgo lower than expected, the A/E ratio would have been lower– the claim experience would have been better

- If the death claims outgo were lower than expected and CI claims outgo greater than expected, the A/E ratio would have been higher – the claim experience would have been worse

- The underwriter suggestion might be based on the observation that a greater proportion of claims were deaths immediately following diagnosis of one of the critical illnesses covered under the policy CI (that is, dying within the survival period typically applied under stand-alone contracts). These claims would not have been admitted under a stand-alone contract and so the experience could have been better

- It might be possible that the underwriter ignored the fact that the expected claims will also be lower under stand-alone contracts

- So, it is important to check the following two aspects before making any decision on product design and/or pricing basis:

— Look at both actual and expected claims had they been stand-alone contracts to confirm if the experience would have been better or worse
— if there are any one-off circumstances which are not likely to repeat in the future that could have led the underwriter to believe that the claims experience would have been better

[14]

Q3)

a) Advantages to the policyholders

- The need for switching to another insurer arises for the following reasons
  - Dissatisfied customer service (self experience, or poor media publicity)
  - Relocation (to switch to the insurer which has heavy presence in the area where you live in terms of network of recognized hospitals etc.)
  - Greater financial security (one insurer may be viewed as financially stronger than another)
  - Availability of other flexibility (such as family floater cover)

- Under private medical insurance, a policy-holder is given health cover for a year and the same has to be renewed every year. If someone intends to switch over to a new firm, he/she stands to lose on the following
  - No-claim bonus accumulated for claim-free years
  - Established track record of pre-existing illness coverage

- The portability clause will address the above concerns because one can switch the insurer without losing on the accumulated benefits

- For senior citizens who bought the policy before turning senior, it becomes more difficult because companies are reluctant to sell new medical policies to the elderly. The portability clause will address this concern because the insurers will have to accept the transferring policies regardless of the age or health status of the policy holder.

- The portability is likely to result in greater benefits, due to insurers attempting to retain their existing policy holders and lure policy holders of other insurers, in terms of
  - Superior customer service
  - Reduced instances of frivolously rejecting any claims
  - More comprehensive and competitive products
  - No underwriting for transferring policies and so possibly reduced premium

b) Risks to the insurer

- Risk of increased non-renewal
  - if the customer service falls short of the industry standard
  - due to bad publicity in terms of claims repudiation
  - if the insurer is not financially as sound or seen financially not sound (low credit rating)
  - premium/benefits not competitive – even if the customer service is good policy holder can change for cheaper price or more tailored product
  - bonus-malus system not competitive
- Risk of not being able to recoup initial expenses with the renewal experience less predictable and quite sensitive to competition
- Selective withdrawal – claiming policyholders likely to stay on whereas healthy policyholders shopping around
- Risk of accepting bad lives - transferring insurer's underwriting standards are not good
- Anti-selection if the rating factors not comprehensive and/or pre-existing illness definitions are different
- Medical insurance risks/costs vary from region to region – risk of mis-pricing due to assumed mix of business by region becoming invalid as policyholders switch to insurers who have heavy presence in a particular region (in terms customer service/hospital network)
- Policyholders may not take advice from professional advisors before switching – risk of misunderstanding the policy provisions leading to disgruntled customers
- Reduced volume - Brokers unhappy and may not source new business actively
  - Their initial commission may be reduced with greater uncertainty about the duration of the policyholder with one insurer
  - losing out on their renewal commission which they would have otherwise earned by putting the unsatisfied policyholder to another insurer – unless they continue to get the same level of renewal commission from the new insurer

- Policies in claim – risk of inappropriate reserve transfer; different hospitals authorized; different TPA involved; case reserves need to be established for transfers – additional administrative costs,
- Risk paying for claims not priced or not reserved – eg. claims put to the new insurer which supposedly manifested in the tenure with the previous insurer
- Data risk - risk of not getting full data/documentation transferred leading to complications in claims underwriting
- Risk of reinsurer's dictating different terms for policies underwritten by another insurer (covered by another reinsurer)
- Potential aggregation/concentration of risk – due to lack of comprehensive rating factors, regional-presence etc.
- Increased administration – sharing of data/documentation, need to pay close vigil to what competition is doing differently etc

[10]

Q4)

a) Drawbacks of formula approach

- multi-state models are impossible
- cannot easily allow for the waiver of premium benefit
- does not allow for separate inspection of premium related flows - We cannot track expenses, claims, premiums *etc* separately each year
- does not allow for the accumulation of reserves - In fact, reserves are ignored completely when using this approach
- does not properly allow for capital needs - It is not possible to allow for the desired rate of return required by shareholders on their capital
- does not allow for the impact of net negative cash flows in any period - In effect we assume that any capital needed can be borrowed at the discount rate used. This is important for capital implications
- does not allow for the variation in returns - The approach uses one fixed discount rate, whereas investment returns might vary over time
- does not allow for changes in the assumed future experience and cannot be used to measure the sensitivity of profit to such variations

b) Assumptions required

- Mortality among healthy (non-claiming) lives
  - less important since there is no death benefit
- Mortality among lives in claim
  - important because this has a bigger financial impact, and because the mortality of sick lives is a lot less predictable than for the population as a whole
- Claim inception rates (rates of transition from health to claiming)
  - very important
- Claim termination rates
  - combination of appropriate recovery and mortality rates
  - the benefit will cease if the claimant recovers or dies or if the policy expires
  - the rate of recovery or rate of continuation is crucial to the pricing
  - recovery and mortality rates should not be overstated
- lapse
  - early duration lapse – important due to negative asset share
  - later duration lapse – important if there are surrender benefits paid which are greater than the asset share
  - important if there is potential lapse and re-entry (due to premium rates falling)
  - important due to potential selective lapsing (healthier lives lapse leaving a worsening propensity to claim among the continuing lives)
- Expenses
  - Important to allow for both direct and indirect expenses
  - Should be consistent with the volume and mix of business assumption
- Expense inflation
  - Must allow for this in the pricing as we are charging a level premium
  - Should be consistent with the investment return assumption
- Commission and claw-back
  - This will be based on an assumed mix of future new business by distribution channel
  - Claw-back assumption should be consistent with the lapse assumption
- Investment return

  - Being a protection product, the reserve is not likely to be large; however the investment risk is being borne by the insurer and this assumption is important
- Volume of business
  - Required to assistant in the allocation of expenses to the premium basis for each typical policy
  - Important in assessing the amount of company reserves that will be needed to support the product launch

- Mix of business
  - By policy size - required because underlying experience vary according to the policy size. Larger policies tend to have better claim experience as the policy holders are likely to be from higher socio-economic groups and there is stricter underwriting for larger policies
  - By distribution channel – different target market; different underwriting; different claim experience; different level of expenses
  - By sex – required if unisex rates to be charged
  - By region – risk vary between regions – eg. the IP risk can vary dramatically between a heavy industrial urban centre and an agricultural rural community

- Taxation
  - Allow for both current and expected future changes in tax rates
- Profit criteria
  - Share holders' expected return on capital

c) Sales director's suggestions

T*he policy term should extend to age 65 instead of the fixed 10 years*

- It can help increase sales due to
  - Age 65 – typical retirement age – so, will have greater appeal to policyholders because it covers the full typical earning period
  - the 10 years term does not meet the needs of customers who look at the IP policy as a means of repaying mortgage which is typically of longer duration, say, 20 years

- On the other hand, the term of the policy could be too long to provide premium guarantee, a life aged 25 yrs will have 40 yrs team. This will mean the premiums rates will have to be reviewable due to greater unpredictability around future claim inception and termination rates – a premium reviewability clause may put off the customers and thus reducing sales. If we were to continue premium guarantee, the premium may become exorbitantly high due to the need to build contingent margins in the pricing and reserving.

Benefit should be increased to 100% of the gross annual income

- This can help increasing sales as it will attract customers as it replaces the whole income during periods of incapacity
- However, the risk is that there will be no incentive for the claimant to return to work and thus increasing the claim outgo and the claim monitoring costs. The increased costs would make the premium unattractive and thus reduce sales
- Again the 100% gross income which is greater than the net (of tax) income that the policyholder would otherwise get will make the claimant better-off staying sick rather than return to work
- Also expenses in disability may be less than those in normal (working health) and so restricting benefit to 60%-75% of net annual income may be a better deal
- It is also important to ensure that the income covers all sources of income, otherwise even a lower replacement ratio will not provide adequate incentive for claimant's to return to work
- The differences in the tax treatment of disability benefits and that of regular income will also needs to be considered while choosing the appropriate replacement ratio

Benefit should commence from day one of sickness

- This can help increasing sales as the benefit will be paid for short-duration sicknesses as well
- There will be more number of claims and for a longer period - increased admin and claim costs leading to high premium – will put off customers
- Also, greater scope for anti-selection and thus increased (claim) underwriting and administration costs - resulting in higher premium putting off customers

- There is also no real need for customers to be paid from day one – most policyholders would not want to submit a claim for a couple of days of flu
- We would need to consider ho long and how much is the state/employer sickness benefits so that the deferred period is set to make the policy complimentary
- On the other hand, a zero deferred period would encourage claimants to return to work as they will not have to serve another deferred period should the illness relapse shortly after return to work. This will reduce claim costs leading to reduced premium and increased sales.
- A better alternative would be to consider a linked-claims period where the deferred period is waived if the claim recurs within a specified period of time, say 4 weeks. This will encourage return to work and thus reduce claim cost.
- If the deferred period of one year is too long, then another alternative is to consider a split deferred period. For example, no benefit during the first 3 months, 50% benefit during the next 3 months and full benefit thereafter.

For all these suggestions, the following needs to be considered:

- What is the competition doing?
- Is there any market research backing these suggestions or they are driven by the broker's preference?
- How does it fit into the company strategy – breaking into the market as a loss leader?
- Any regulatory restrictions on these?

d) why not reinsure & risks of not reinsuring

why not reinsure:

- reinsurance is expensive or unsuitable
- bad experience dealing with reinsurers on PMI eg. disputes over large claim recovery
- worried about the financial strength of the reinsurers being low – risk of default
- lot of experience in medical underwriting and so do not think reinsurer expertise required on underwriting
- strong in house actuarial team or technical support from its international partners who have good experience with the IP product and so reinsurers expertise with pricing not required
- launching the product on a limited scale (to test the water) and planning to sell only restricted volumes and so the company believes any claim volatility is manageable
- large company, may have huge free assets and so willing to take the risk
- has had success in setting up risk fluctuation reserve instead of reinsurance at much cheaper cost and so wants to adopt the same approach for the new product
- is not an indemnity product and so upside claim potential is limited – so believes that reinsurance risk/profit transfer is inappropriate
- no or very little tax/regulatory capital arbitrage using reinsurance

Risks of not reinsuring:

- new product with no data – local factors not built in – risk of mispricing without technical support from reinsurers – though actuarial consultants may help with this
- product poorly designed (eg. loose claim definitions) and hence the risk of not being able to reinsure at a later stage when the portfolio gets bigger and accumulation risk becoming material
- risk profile is quite different from that of PMI – so, risk of getting underwriting wrong – policy holders taking advantage of this and select against the company,
- or the risk of having to decline more cases with lack of expertise on substandard lives' underwriting – may lead to bad publicity and poor sales
- not getting reinsurer support when expanding to Group IP business (where the accumulation and catastrophe risks may mean reinsurance is necessary)
- with poor design – may not get reinsurer support when the regulatory/tax regime change making reinsurance a compelling proposition

[27]

Q5)

a) possible items of expenses of management which can form part of disclosures

- Commission – expressed as premium related or other
  - Separately for initial and renewal
  - Separately for each distribution channel
- Non-commission expenses
  - Initial expenses – expressed as per policy, premium related, benefit amount related
  - Renewal expenses – expressed as per policy, premium related, benefit amount related
  - Termination expenses – expressed as per policy, premium related, benefit amount related
  - Claims expenses
  - Investment expenses
- The expenses can be disclosed for
  - The whole business of an insurer
  - The business of separate accounting funds
  - Each main product line

b) possible users of disclosure

1. Regulator
2. Tax authorities
3. External auditors
4. Rating agencies
5. Competitors
6. Industry analysts
7. Existing policyholders
8. Prospective policyholders
9. Sales persons
10. Employees of insurers
11. Prospective new entrants to industry
12. Reinsurers
13. Prospective shareholders
14. Government

[6]

Q6)

a) investment considerations

- The returns on available assets
- Need to match assets to liabilities by
  - Nature
  - Term
  - uncertainty / liquidity
  - Currency
- There will be additional expenses of managing separate funds
- Need to consider possible regulatory restrictions on investment of health insurance funds
- Minimum size for investment in separate funds – availability of capital
  - The amount in the various funds could be less than the minimum amount required.
  - Will need capital input either from shareholders or from any free assets of life insurance fund

b) investment strategy for income protection contract vs. critical illness product

- Matching assets by nature of benefit payments
  - IP – regular payouts with amounts linked to salary
    - So related to earnings inflation
    - Need to invest in assets with real returns
  - CI – lump sum benefit
    - Guaranteed in money terms
    - Need to invest in assets with fixed returns
- Matching assets by term of liabilities

- IP – long term up to retirement age
- CI – medium to long term

- Matching assets by uncertainty / volatility of benefit payments
  - IP – real amounts known in advance
    - uncertainty in terms of future earnings inflation
    - uncertainty of period of incapacity
    - Need more liquid and real investments
  - CI – amount normally known in advance

[6]

Q7)

a) 'persistency

- The first year persistency rate is the ratio of the number of contracts in force at the end of first policy anniversary to the total number of contracts issued.
- The calculation is to be adjusted to exclude the effects of claims and maturities.
- Similar rates can be calculated for second year, third year etc persistency rates
- The rates can be analysed in terms of premiums and number of policies
- The rate can be analysed across different homogeneous groups subject to availability of sufficient data to draw credible results

b) possible reasons for the worsening persistency experience and ways to address them

- Mis-selling
  - Customer realizes the policy benefits are not as expected at time of sale
  - Churning of policies by sales intermediary
  - Ensure product designs meet customer needs
  - Ensure sales staff are adequately trained to ensure they understand the product they sell
  - Ensure sales incentive schemes encourage good persistency
- Increased competition with competition offering cheaper cover and / or cover for more conditions
  - Ensure product design and price are in line with the products offered by competition
- Lapse and re-entry as a result of re-pricing
  - Offer revised rates to existing customers as well
  - Reduce initial commission or increase renewal commission
  - Claw back initial commission of lapsed policies
- Inadequate customer support after sales
  - Can lead to poor publicity of company
  - Company can allocate more resources to customer support
- Reviews
  - Premium reviews which have led to increased premiums
    - Policyholders have lapsed as they could get cheaper cover elsewhere
  - Review of conditions covered and / or their definitions
    - The reviewed conditions and / or definitions might appear unattractive as compared to that available elsewhere in market
  - Need to keep this in mind while reviewing rates / conditions / definitions
- More premiums / policies with premiums in cash as compared to direct debit
  - Encourage more policies with direct debit
  - Have in place adequate customer support to follow up on renewals
- General market trend of reduced persistency due to
  - economic downturn
  - reduced tax incentives
- General movement in market from standalone towards accelerated cover
  - The company has decided to continue with standalone cover
  - The company should consider providing cover that is more attractive to customers

[11]

Q8)

a) contributions of underwriters at various stages of product life

- Product development stage
  - Their Knowledge of new business procedures, their awareness of risks presented can be useful in product development
  - Can provide useful advice on definitions of medical conditions to be used in policy wordings
- Application stage
  - Protect company from anti-selection
  - Enable insurers to identify substandard lives to whom special terms must be quoted
  - Adequate risk classification will help to ensure that all risks are rated fairly
  - Ensure that actual morbidity experience does not depart too far from expected as assumed in pricing of contracts
  - Help to reduce risk of over-insurance by financial underwriting
- Claims stage
  - Ensure claims admitted in line with policy conditions
  - Claim conditions compared with admissions at proposal stage

b) pros and cons of using such a simplified underwriting approach

+ faster processing of applications
+ saves underwriting costs
+ easier for sales staff to market
+ can add quickly to business volumes if product gets popular
+ saves systems development costs as less information is stored
- can be difficult for the customer to understand, hence increased cancellations / lapses
- can lead to misselling if sales intermediary remuneration is independent of persistency experience
- can lead to anti-selection and non-disclosure as cover easily available via a short form
- can lead to dissatisfied customers if claims are rejected subsequently
- can invite subsequent statutory intervention on account of dissatisfied customers
- managing business volumes larger than expected could lead to additional costs
- losses if anti-selection has not been allowed for in pricing

[9]

Q9)

a) ways in which the embedded value can be used

- Shareholders (existing and prospective) – published EVs will directly impact share price
- Provide management information
- Information for accounts
- Change in EV will allow company to validate calculations, assumptions and data used
- Product development, pricing – can show if any products need to be repriced / withdrawn
- Relative EVs of different products can be used in sales strategy
- Relative EVs of business by sales channel can be used in finalizing sales remuneration
- Projected EVs can be used in assessing any financial or strategic management decisions
- Best measure of a company's real worth
- Added with good will, gives appraisal value, which is useful during acquisitions or mergers

b) impact on embedded value

i) valuation of assets

- will impact the excess of value of assets over liabilities, hence
  - will impact the surplus and capital tied up for statutory purposes
- this will impact the future shareholder transfers

- higher value of assets would lead to higher EV, and vice versa, other things being equal

ii) choice of assumptions for projecting and discounting liabilities

- assumptions for projecting liabilities will impact the projected future cash flows and hence future liabilities
- assumptions for discounting liabilities will impact the projected reserve requirements
- this will impact the amount of projected surplus arising and hence shareholder transfers
- optimistic assumptions will lead to higher EV, and vice versa, other things being equal

iii) statutory capital requirement

- this will impact the amount of capital tied up in relatively lower yielding regulation-compliant investments
- this will impact the surplus generated from higher returns from investing in relatively riskier assets
- higher statutory capital requirement will lead to lower EV, other things being equal

iv) reinsurance

- depending on the projected reinsurance result, this will impact the projected cash flows net of reinsurance
- this could impact the projected values of liabilities net of reinsurance, and possibly solvency capital requirement
- this will impact the amounts of projected surplus and hence shareholder transfers
- other things being equal, if reinsurance is projected to be profitable for the company, the effect of reinsurance will be to increase EV

[13]

[Total marks 100]

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