Institute of Actuaries of India

Subject CA1-II – Actuarial Risk Management

September 2016 Examination

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.

Solution 1:

i)

The risk that may be covered in the pet policy:

- Veterinary fees covering illness and injury or ongoing routine treatments
- Death benefit, possibly with a maximum age limit
- Theft of pet or missing pet
- Advertising and reward for a missing pet
- Third party liability eg personal injury
- Accidental damage to property caused by pet
- Pet care cost if owner is traveling for short durations

[3]

ii)

- Selling the product directly will use existing distribution and so will minimise costs.
- Admin systems and staffing is already in place.
- However, this is a new line of business for the insurer so may be lacking expertise and data.
- The company can have more control over how the product is sold and whom it is sold to.
- It may be a cheaper option in terms of initial outlay i.e. capital costs
- but ultimately could result in extra work in order to get enough volumes and hence pricing can become wrong.

On the other side, distributing through existing channels (like pet shops, vets, etc)

- may be beneficial for the insurance company. They will already have the client information
- they may have better idea with respect to selection of risks
- the sale may be easier as the customer may be more willing to listen to these people
- The company will have less control over how the product is sold and who to.
- Possibly low initial capital outlay but a sharing of profits.
- There may be some regulatory issues (eg related to selling practices whether they can sell) and possibly a risk to their reputation if policy does not pay.

[5]
[8 Marks]

Solution 2:

i)

- General principle that for the group of members as a whole, the assumptions may, on average, provide a good estimate of future experience
- Relationship between assumptions is equally valid.
- Need to take account of individual assumptions which significantly affect the finances of the scheme e.g. marital status & age of spouse.
- Relative importance & sensitivity of assumptions.
- Volume & reliability of experience data e.g. mortality.
- However, Industry Statistics also may be valid for large Schemes.
- Allowance for investment vehicle & asset mix and hence likely return.
- Implicit / explicit scheme expenses (admin, actuarial & legal fees).
- Membership profile — relevance / possibility of "accurate" estimates.
- Early retirement — availability & level of benefits.
- Ill health retirement — availability & level of benefits
- Insured Death in Service benefits.
- Withdrawal rates – scheme experience
- Salary Scale – including future salary hikes
- Employer/Trustee discussions – their opinion on future benefit enhancements, escalations, etc
- Annuity rates – best available in the market else it is self administered

[6]

ii)

The basic considerations would be same as the previous answer, however

- the variance of the "best estimate" will be larger for smaller schemes.
- Volatility of contribution rate greater for small schemes.
- Hence, more "standard" approach for smaller schemes with respect to benefit formula or assumptions (something that may be based on the industry average)
- Withdrawal rates — often ignored for small schemes, where the withdrawal benefits may not be significant
- Employer/Trustee discussion less likely for smaller schemes;
- you would take a conservative approach based on industry average assumptions for various parameters.
- Annuity rates may be crucial for a small scheme, due to cash flow considerations.
- In a small scheme, one member may significantly affect the liabilities and therefore it may be appropriate to be a little more conservative.

[4]

[10 Marks]

Solution 3:

i) Life insurance company will analyse its expenses:
To allocate it correctly to different classes of business in order to

- To determine the expense loadings for new products
- To determine the expense loadings for provisioning purposes
- To arrive at the profitability of the products
- To spot inefficiencies within the organization
- For financial planning
- Cashflow management

[3]

ii)

a) It is a cost relating to new business
It will be allocated to the product lines that will be sold by this distribution channel.
The cost could be amortised over a reasonable period (say 5 years) or over the future expected life time of the channel.
It can be per policy or premium related or combination of both

[2]

b) This is a onetime expense and hence it can either be -

- Typically ignored as it is unlikely to happen in future.
- If it is expected that such incentives will become a regular feature, then it can be reflected as a part of salary expenses

[2]

c) It is a support function for all classes of business and for all functions.
If there are more employees in any department the HR work can be expected to be more in that department.
Expenses are to be split pragmatically and allocated to various departments as follows-

- The HR department costs could be allocated based on the number of employees in departments or
- It can be treated as an overhead and allocated in the same proportion as rest of expenses.

[3]
[10 Marks]

Solution 4:

i) As the scheme is on pay as you go basis, the pensions must be met from the tax contributions/increasing fiscal deficit.

The reasons for the unsustainability of state pension could be

Burden increases due to benefits outpacing taxes.

- Lowering birth rates– Lower number of individuals in working age.
- Individuals starting to work at later ages (longer education period) than earlier so lesser tax contributions
- Individuals taking career breaks
- Low wages or wages growing more slowly and hence lower tax contributions
- Tax rates reduced.
- Many people at working age migrating to other countries with better prospects

Increasing longevity

- pensioners living longer hence increasing total costs-
- also due to fewer than expected deaths at younger ages more persons reaching retirement age
- Increase in expenses associated with paying the benefits

[5]

ii)

a) Government:

+ money will be available for other purposes than paying pensions,

+State can manage its fiscal position better which could lead to better economic prospects for country

-the benefit will have to be continued for unemployed and self employed and those already availing benefits

[2]

b) Employers:

+ they need not administer the scheme as it is centrally maintained

+DC scheme and hence known outgo as % of salary

+regular contributions will ease management of financial burden

+administration costs will be less due to economies of scale as management is centralized

-cost to employer increases compared to earlier but the employer may reduce some other benefit to maintain their overall outgo at same level.

-employers making less profits or losses will find it difficult to contribute in a difficult year.

- contribution rate should not be too high to lead to financial difficulties for employers

[3]

c) Employees:
+ regular contributions will not be burdensome
+ as managed by government will be managed judiciously
+ the employees can choose the fund type to invest depending on their risk appetite.
-less money will be available to meet immediate needs. Which could hurt people in lower income bracket
-pension benefit depends on performance of fund and fund choices made, immediate annuity rates offered by insurance companies. No guarantee that pension will be adequate. [1]
-Employees have to move from government guaranteed pension to private insurers offered annuities
- employees may choose very risky funds without understanding risk and face loses.
-risk that pension will be inadequate compared to existing state pension
-employees in lower income strata would have accumulated less and more risk that pension will be inadequate to them.
- State pension ending abruptly may not be acceptable for older employees who have very limited period to save for retirement

[4]
[14 Marks]

Solution 5:

i) Need to estimate the future experience i.e. incidence rate /probability of hospitalization of those who will be insured under this policy …
… which is a problem as the company has no past data.
Is there any industry published data in the country for similar product or any other related product for e. g hospitalization expense reimbursement schemes catering to the specified target segment?
How relevant is the published industry for determining population morbidity
Is there any national statistics for incidence rate/hospitalization rate available for the population being targeted?
Do reinsurers have any useful data? – may not be much for the country, so need to look at reinsurers' data relating to other countries, bearing in mind the differences.
For example, look at their relative population mortality and morbidity characteristics, underwriting differences, cultural differences.
Different policy wordings will cause further differences in the experience data compared with the new product.
Relevant available experience data to be heterogeneous due to changes in policy wordings. Claims and selection processes, so even the trends may be misleading.
So overall it will be difficult to get a good fix on the inception rates.
However this could be managed by keeping the rates reviewable
Once the company has decided on a suitable best estimate of the future experience, a margin will need to be added. This should be reasonably kept high because of the uncertainty ...

… but not too high because it is a government scheme and they don't want it to be too expensive for it to succeed and also there could be a the reviewability clause
The risk is that being a government scheme, they may be resistance to future review of rates.

[6]

ii) Risks can be mitigated by
- reinsuring a large part of the risk
Risk reinsurance may not be available or might be pricey
- incorporating ample margins in the premium rates
…. This may not be practical as the government may not agree to a very expensive rate
-insisting on reviewability of premium rates
- insist on a list of approved hospitals for hospitalization
- initial waiting period of six months, to avoid any anti-selection
- excluding certain procedures/illnesses which does not require hospitalization for eg., cataract, to ensure people do not get hospitalized for unnecessary reasons.
-Benefit to commence only if hospitalization extends beyond 48 hrs or 96 hrs etc. to ensure benefit is not trivialized
-Limiting the benefit to for eg. Not more than 30 days stay in hospital in a year or during policy period to avoid risk of unnecessary prolonged stay in hospital as well as not to keep the benefit open ended
- excluding procedures which are not clinically necessary for e.g., cosmetic surgery,
- offer some NCD to people who don't claim, that may encourage better claims experience.

[6]

iii) Pros and cons for all insurers to use the same premium rate for this plan
+ companies are not competing on rates, so can concentrate on the other aspects of the product/ risk management
+ It was a new risk, no data available with anyone anyway. There would pricing challenges
+ Having the uniform rate and same terms and conditions gives a bit confidence that everyone's experience will be same
- your expectation of the risk rates may be different, because you might be attracting a different population, due to your distribution or presence only in urban areas, is different from the lead insurer
- your expense and profit loadings could be different
- as there is no difference in product feature and price, it can become difficult to sell this product (for smaller companies)
- large companies may have better reach and distribution to get sufficient volumes

[6]
[18 Marks]

Solution 6:

i) The need for regulation of financial markets is greater than the need for regulation of most other
markets for two reasons:

- Confidence
- Information asymmetry

Confidence

- Problems in one area could spread into other parts of the system, leading to a systematic collapse
- To prevent loss of confidence
- The concern is not merely one participant failing but that leading to complete loss of confidence in the whole system

Asymmetric information

- expertise and negotiating strength in financial transactions, particularly in retail markets, is more towards the financial institution
- this asymmetry with respect to financial transactions related to insurance and pensions can have a significant impact on the future economic welfare of the individuals.

[4]

ii)

- Regulation can take many forms. It can be prescriptive, with details rules setting out what may or may not be done.
- Alternatively, regulation can involve freedom of action but with rules on publicity so that third parties are fully informed about the providers of financial services.
- Finally, the regime can allow for freedom of action but prescribe the outcomes that will be tolerated.

Listing in the order of increasing degree of regulation, the following types of regulatory regime are possible:

I. Unregulated markets

- Where the costs of regulation outweigh the benefits, often the best option may involve no
  specific regulations.
- The participants are however still subject to the general trading and other laws applicable in the particular jurisdiction in which they operate.

II. Voluntary codes of conduct

- The rules and regulations are set by those with the greatest knowledge of the industry.
- This voluntary code will have no legal backing in most cases, and in all likelihood less severe
  penalties on a breach of regulations, than with statutory regulation.
- This method is vulnerable to a lack of public confidence.

III. Self regulation

- A self-regulatory system is organised and operated by the participants in a particular market
  without the regulator's intervention.
- The incentive is the fact that the regulation is an economic good that consumers of financial services are willing to pay for and which will benefit all participants.
- There may also be a threat that is self regulation does not work well, the regulator may impose statutory regulation.

IV. Statutory regulation

- The regulator and the government set out the rules and regulations and police them.
- There are usually stringent reporting and compliance requirements, and this method can be costly and inflexible.
- It is however less open to abuse and therefore commands greater public confidence.

V. Mixed regimes

- In practice many regulatory regimes are a mixture of all of the systems described above, with
  codes of practice, self- regulation, and statutory regulation all operating in parallel.
- Even a regime that is self-regulatory in name is likely to have statutory aspects.
- Regulations are often developed by market-driven private institutions (such as stock exchanges) as well as by governments.

[7]

iii)

I. Unregulated markets

- Markets where only professionals operate, for example any wholesale market or where commodity products with guaranteed benefits are sold only on price, such as term assurance.
- In such markets the parties are sufficiently well informed, and the costs of regulating may far outweigh the benefits.

II. Voluntary codes of conduct

- This is best administered by a commonly agreed code of conduct, and voluntary compliance by all participants.

- An example may be that a company will not "poach" key personnel from another competitor.
- It is costly and practically difficult to regulate this otherwise.

III. Self regulation

- An example is that provided by professional bodies, such as the Institute of Actuaries of India or Institute of Chartered Accountants of India.
- These aim to regulate the activities of their individual members for the greater good of both the profession as a whole, and the other parties for whom they provide their services.
- In such situations the professionals are the most well informed and knowledgeable to organise and operate a regulatory system.
- It is also in the interests of the profession to be seen to be providing services within a soundly managed environment; otherwise their clients would lose faith in the system.

IV. Statutory regulation

- This is where rules need to be prescribed and everyone has to follow it.
- Premium tariffs, distribution norms, the capital adequacy and solvency requirements that are generally prescribed and regulated by the regulator or the government. These need to be prescribed to ensure the markets don't fail
- It can be principle based regulations when players and markets are evolved and more rule based where the market is not mature or evolved.
- Rules will ensure a level playing field, and enhance public confidence in the security and durability of the participants in the financial system.

V. Mixed regimes

- Most markets (from new to mature) may actually operate in a mixed environment, where part of the rules are self regulated and part prescribed
- This system works well when –
  a) There are fairly strong professional bodies like actuaries, accountants, brokers capable of self-governance
  b) The market is not mature in certain aspects like solvency and capital norms and hence some rules are required.
- Like, product filing for approval.
  - The actuary may have the freedom to price the product on the bases chosen by him however, may be required to certify the adequacy of premium rates. Also the actuary will have the freedom to take own decision with respect to methodology or assumptions but he will be governed by the guidance and regulations of his professional body.

- In addition, there may a review process that may require filing certain details about the new product with the regulator, prior to launch. This will enable participants to launch products that satisfy consumer needs, but which are at the same time viable from the company's point of view.
- The regulator is able to review the process in order to ensure that the system is not abused by a few.

[8]
[19 Marks]

Solution 7:
i)

1. This product provides regular income to the owner and spouse. This will be helpful to meet their monthly needs after their retirement as there is no social security.
2. This product provides no lump sum hence it does not provide for any lump sum expenses such as hospitalization expenses, repaying loan etc.
3. Income is paid as long as they are alive. – hence protects them from longevity risks.
4. But only fixed income is paid hence does not provide protection from inflation.
5. The owners continue to stay in their own home as long as they are alive – gives lot of emotional advantage as they need not vacate the house.
6. Spouse gets income and also continue to stay in the house as long as alive hence the owner can be satisfied that the interest of spouse is also taken care of.
7. This product is only suitable to owners and their spouses. But the contract does not provide any income for their other dependents eg. minor children after their death.
8. There is no surrender option and hence the owners cannot come out of the contract.
9. The owners once entered into the contract cannot benefit from increase in property value(they will not get higher income), or
10. increase in interest rates etc (they cannot surrender and go for better fixed income)

[5]

ii) Risks to the service provider

Main risk

- The property market falls at the point of sale and the property is worth less than the benefits given so far.

Longevity risk:

- The owners of the property live longer than expected and the providers make losses

Reputational Risk:

- If the property prices increases steeply after purchasing the contract the owners may feel that they are receiving less value for money leading to reputational risk.
- There will be no past data as it is a new product. Hence there could be lot of margins in pricing. This could make the product unattractive to customers.

Interest rate risk/Asset Liability Mismatch risk

- Risk of not being able to earn the appropriate returns to make the fixed benefit payments to owner or
- Unable to invest in long dated investments to match the expected tenure of benefit payments leading to ALM issues.

Expense Risks:
- If the expenses of servicing the plan such as property valuations, legal costs, expense of monthly income payment etc. is much higher than expected it could again lead to lesser profits.

Liquidity Risk:
- Property is not easy to sell, especially if you don't want to seem desperate and get good value for the property
- It is an illiquid asset for the provider

Maintenance of property: .
- If the property is degenerated/ not maintained well by customers it could lead to reduction in value of property at time of sale or increased expenses for provider
- customers lose interest in the property or are unable to maintain property due to old age
- if the property is not insured properly any damage such as fire etc. could lead to losses.

Poor sales:
- If the product sales are poor the development costs cannot be recovered.

Concentration of risk:
- If many properties are sold in the same region it could lead to increased risk of losses due to natural calamities such as earthquake, tsunami and bomb blast etc.

Operational risk
Legal litigations/court cases:
- Properties without proper title could lead to litigations
- Entering into legal battles with dependents/owners if the documentation of contracts are not clear

[9]

iii) Steps to be taken
Limitations:
- Ceiling on Maximum benefit given (present value of future annuities), for eg. Not more than 70% of property value to reduce the risk of fall in property values.
- To fix minimum entry age high for eg. 60+ to avoid longevity risk.
- Maximum age of Property at entry to be limited(for eg., not more than 10 year old property), so that they will not get scrap value and maintenance costs will also be less.

- Pricing to be done with sufficient margins so that interest rate risk/ALM risk/expense risk/longevity risk are addressed.
- To take into account the stage of the property market and historical trends while pricing products

Marketing

- Marketing the product well so that the minimum sales are done.

Insurance:

- To include the insurance of property as part of the contract

Maintenance of property:

- To include in the contract that the property to be properly maintained otherwise penalty clause to be imposed.
- Or at regular intervals the property maintenance would be checked and further income would be paid only if the property is maintained to some minimum standards

Diversification

- To ensure the sale of product is done in different regions/ different places to avoid concentration of risk
- To limit the maximum sales that can be done in one region

Legal requirements:

- To ensure that the contracts are properly worded to avoid any litigations
- Expert legal advisers are employed to give the proper verification of the title.
- This is crucial as we don't want to get into legal issues at the time of selling the property

[7]
[21 Marks]

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