Institute of Actuaries of India

Subject CA1-II – Actuarial Risk Management

March 2018 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.

Solution 1:

As with any form of communication, one should know the client and the client's interests and pitch the language, tone and form of the communication at the appropriate level

Care should be taken to avoid making the presentation including any background information and introduction so complicated that it becomes confusing and distracting

Data or information used in the underlying work, along with the source, any uncertainty over its accuracy and how the uncertainty was dealt with it in the calculation should be clearly communicated

Any assumptions or judgment adopted and any areas of uncertainty around the numbers should be clearly presented

It will be beneficial to present the sensitivity of the numbers to various assumptions

Communicate any response to any query of the Board members in a way that is understood by the them

It is important to check that the client has fully understood the explanation

In reporting and communicating the results of an investigation to a client the actuary should take account of any professional guidance on the content and format of such a report for example Technical Actuarial Standards in UK

[5 marks]

Solution 2:

i) Reinsurer needs to have sufficient capital to write this business to satisfy its regulatory capital requirement as well internal solvency targets.

The business objectives of the re-insurer particularly if it is looking to establish in a new market or want to build relationship with large insurer

The risk appetite of the shareholders to underwrite this risk

Level of aggregation/diversification of the risk on the re-insurer's portfolio from writing this business

Is there any support re-insurer has from other re-insurer i.e. - retrocession

The premium it might be able to obtain for the cover and its adequacy thereof considering the risks taken

The global experience it might have in writing such kind of business

The expected business volume - Greater volume will lead to better pooling of risks as well as ability to spread overheads

The agreement that can be entered with the cedant on major items like for example definition of catastrophe and whether it is significantly deviating from international definition/competition

[5]

ii)

Reinsurer-Purchasing a XL cover - risk, per event – Issue is availability and costs of retrocession.

Holding additional capital: having an internal capital ratio greater than the regulatory minimum-Is this the optimal usage of scarce capital, shareholders may view it as sub-optimal

To smooth results, a company may establish a claims equalisation reserve in years when no claim arises, with a view to using the reserve to smooth results when a claim does occur. Equalisation reserves are seen as a way of deferring profits and hence tax leading to issue with tax authority.

[4]

[9 Marks]

Solution 3:

i) In general, there could be a reduction in expenses due to:

- Do not have to go to work: spends on travel costs to office, office wear, cost of support systems (more helpers for cooking/cleaning etc.) may no longer be required
- Can lead a healthy lifestyle post retirement due to reduced stress levels. Hence reduced medical costs.
- Housing Loans/ vehicle loans EMI may not be there as they may be closed before retirement
- No need to save for post-retirement
- Dependents may have settled down and moved out so no costs in their respect post retirement

Increase in expenses due to:

- Medical costs can increase: ageing related ailments or idle mind is a devil's workshop.
- Cost may increase due to leisure activities/hobbies
- Cost may increase due to more travel for leisure

[4]

ii)

Primarily information is required on

- What are the assets and liabilities as on date/ likely on retirement
- What are income/expenditure levels- now /likely on retirement.
- Disposable income that can be set aside for retirement savings monthly/yearly/one time.
- What does comfortable retired life mean for him- maintaining a certain proportion of pre – retirement income or something else

- He may need advice in deciding on each of the above item for which the following information may help further.

Liabilities

Housing loan/ vehicle loans/Any other loans – how are the repayments like to be met. Will there be liability still post retirement

Dependents
- Age of dependents/spouse
- Expenditure for dependents – education/marriage
- Any assets to be set aside

Health condition
- Medical conditions of self/spouse/dependents
- Ailments – likely costs
- Any Insurance for the same

Assets
- Existing assets & likely income from them.
- Any inheritances & likely income
- House Owned or rented

Existing Asset/expected asset details like
- Insurance for self, spouse and dependents
- Any employer sponsored schemes. Is it defined benefit or defined contribution.
- If defined contribution type, corpus available and the likely accumulation to retirement.
- If defined benefit type, what is the likely pension/corpus at retirement.
- Likely State benefits, if any, at retirement.

Risk
- Appetite for risk. Risk averse/risk taker/neutral.

[6]

[10 Marks]

Solution 4:

i) The Jeweler may be introducing this scheme for the following reasons.
- To attract new customers and retain existing customers
- By offering such schemes the Jeweler is encouraging the customers to save money with them and the customer will have to necessarily buy from the Jeweler at the end of the period which will ensure they are able to increase sales.
- Enables them to get the working capital for their business.
- The Jeweler is paying the last instalment instead of interest for the period on the amount saved. Cost of the savings scheme may be cheaper than borrowing money outside.

- Competitors may be offering such scheme [3]

ii)

Advantage to the customers

- A compulsory form of savings.
- The benefit from the scheme is more attractive than other forms of savings.
- The customer is saving to meet his/her emotional need of buying jewelry.

Disadvantages to the customer

- The other forms of savings are more attractive in terms of returns and taxation situation
- The jewelry rates could increase much higher than expected at the end of one year, so that the customer is not able to buy the quantity of jewelry that they wanted to buy at the start of the year leading to discontent.
- If the customer is not able to pay the monthly installments, they may lose the interest on the money (in the form of payment by jeweler.)

[3]

iii)

Risks to the Jeweler

Risks to Jeweler	Mitigation
Take up rate is very less that the expenses incurred (publicity, pamphlets etc.) are not recouped	To do enough market research and look for any other innovative method/improvements in existing scheme
Average monthly savings in the scheme by customers is low compared to expected and lower expense recovery for managing the scheme/cover overheads	Bring in a minimum amount that needs to be invested in the scheme.
If the jewelry rate increases much higher than expected the customer may feel that the investment has not paid off	To make the scheme more attractive. Modify the scheme so that customers can buy units of jewelry every month from monthly contributions. They are thus safe guarded from unexpected increase price of gold/silver etc at the time of purchase of jewelry.
If more customers stop paying the installments after buying into the scheme and they are unhappy that they get back	Clear wordings in the publicity material Alternatively, consider whether any % of installment can be paid by jeweler if for say

only the money paid. Bad publicity.	minimum 6 installments are paid. Or options to carry over scheme over next year
The cost of paying the last installment higher than expected	Ensure that promise made is prudent and does not require overly high risks being taken

[4]

[10 Marks]

Solution 5:

i) The key stakeholders are:

Shareholders
Competitors
Tax Authorities
Regulators
Equity Analysts
Prospective Investors
Policyholders
Creditors

[3]

ii)

Since it is a large multinational adoption of the global standard across the group removes existing diversity if any in insurance accounting for companies based on the local jurisdiction

This result in a significant increase in global comparability and enhance the quality of financial information

For multinational insurer, it will provide a common measure to assess the performance of subsidiaries in various geographies

This will lead to better utilization of the resources as currently the resources and time will be spent to interpret/convert the accounts based on the local jurisdiction

Hence the common standard will reduce financial reporting cost in long term for the multinational insurer

Improved transparency may make insurance group more attractive to investors

The insurer therefore should benefit from greater availability of capital at lower costs

Reduced costs may lead to increase in the return for the shareholders

Or it could lead to lower premiums for prospective policyholders

Improved disclosures will contribute to long-term financial stability of the insurance sector

Hence it will increase policyholder protection

It may enable more effective risk management strategies in a timely manner

It may lead to improved capital allocation between various subsidiaries and business segments

Improving of the governance standards particularly of reporting and actuarial systems

[8]

[11 Marks]

Solution 6:

i)

The principal aims of regulation for insurance industry are:

to correct perceived market inefficiencies and to promote efficient and orderly markets

to protect consumers of insurance products

to maintain confidence in the financial system

to help reduce financial crime.

The need for regulation of financial markets is greater than the need for regulation of most other markets for two reasons: ● confidence ● asymmetric information.

Confidence

The first is the importance of confidence in the insurance industry which is a part of the financial system, the dangers of problems in one area spreading to other parts of the system, and the damage that would be done by a systemic financial collapse. [1]

Asymmetric information

The second reason for the importance of regulating insurance industry is the asymmetry of information between the product provider and the end customer. There is a difference in expertise and negotiating strength that often exists in financial transactions, particularly in retail markets.

[4]

ii)

To ask the banking regulator to regulate the insurance industry as well.

+ As the banking regulators are already regulating banking industry, them regulating insurance industry may help customers to have confidence in the industry.
+ Like banking industry, insurance industry also has a significant impact on future economic welfare of individuals.
+ Many insurance companies may be subsidiaries of Banks, it may be useful to have same regulator
+ Having a same regulator may help both the industries as there may not be conflicting views and regulations which could impact both industries
+ There are some similarities in respect of macro-economic factors and risks like credit risk, operational risk, ALM risk etc.
+banking regulators have expertise in managing risks and hence may adapt easily to regulating insurance as well

+Lower costs than setting up an independent regulator as existing employee can be used

- Insurance products do not have much in common with banking products and hence it needs a different approach. Banking products are short term whereas insurance products are long term.
- The insurance industry in nascent stage, needs more hand holding and monitoring which the banking regulator may not be able to provide due to lack of time
- Banking regulator may not have the expertise to manage this industry as skills required are different
- Banking regulator still might need to spend money for recruiting new employees with requisite skills and other costs

Prescriptive Versus Principle based

+ Prescriptive regulations reduce the likelihood of things going wrong
+ Prescriptive regulations may be suitable for the insurance industry which is in nascent stage
+It builds up customer confidence
+ If not prescriptive the participants may take some actions knowingly or unknowingly which may not be in the best interests of the customers
- Has associated huge costs – direct and indirect
- If too prescriptive it may deter the investors from entering the market
- If too prescriptive it may stifle innovation

Principle based:
+ Costs may not be huge
+ Could attract investors to invest in insurance companies
- How to monitor – then associated costs of monitoring
- If principles are too generic, there could be scope for misuse
- May be difficult for insurance industry as it deals with professionals, distributors, customers etc.

There has to be a balance between the prescriptive and principles-based regulation

[8]

[12 Marks]

Solution 7:

i)

The company would do the valuation exercise for the following reasons:
- To check whether the assets are sufficient to meet the liabilities.
- To arrive at the contribution rate
- It may be statutory requirement
- It is a requirement as per the scheme rules.

[2]

ii) The items of experience that would be analysed at the time of valuation are:

- Death rate of employees
- Death rate of pensioners
- Death rate of dependents
- Disability rates of employees
- Withdrawal of employees split by years of service.
- Mainly split by less than 5 years and greater than or equal to 5 years.
- Salary increases awarded
- Performance of assets
- Incurred Expenses of the scheme
- Proportion of employees with dependents and age difference between members and dependents
- New entrants to the scheme
- Contributions made vs expected

[4]

iii)

Surplus/deficit arises due to actual experience being different from assumed in prior valuation exercise.

- Death rate of employees: Higher than expected deaths of employees than expected triggers pension to dependents which is costlier as full service needs to be taken into account. This would lead to decrease in surplus.
- Death rate of dependents/retired employees: Higher than expected deaths of dependents and retired employees would lead to increase in surplus as no further payments need to be made.
- Disability of employees: Higher disability of employees that qualifies as permanent disability than expected will also trigger pension to dependents which is costlier and would lead to decrease in surplus.
- Withdrawal of employees:
- ➢ Higher withdrawal of employees with service less than 5 years, would lead to no benefit payment and hence increase in surplus. It also leads to lesser number of employees reaching service more than 5 years in the group.
- ➢ Higher withdrawal of employees with service more than 5 years, would lead to no further accrual of pension for future service and salary growth. This may also lead to increase in surplus depending on the type of funding being done.
- Salary growth rates: higher salary growth than assumed would lead to decrease in surplus due to higher pension provision
- Investment return: Higher investment income than expected would lead to increase in surplus.
- Expenses of the scheme: Higher expenses than assumed would lead to decrease in surplus.
- Increase in proportion of employees with dependents would lead to decrease in surplus as the value of the pension cost for dependents increases

- Higher age differences between dependents and employees will increase pension cost as the pension is to be paid for longer period. This would lead to decrease in surplus.
- New entrants: Impact due to actual new entrants depends on how the actual contributions made in respect of them compares with the liability accruing and how does it impact overall balance of the scheme in terms of average age, salary etc.
- Contribution made: Higher contribution than expected could lead to increase in surplus.

[11]

iv)

- Group employee data and actual withdrawals by age, length of service and class of employees as withdrawal experience may differ between factory workers and management.
- Need to ensure that the groups are separate for employees with service less than 5 years and greater than or equal to 5 years.
- For age and service need bands/cells that are credible i.e. may have to group in fairly wide age bands
- For each group compare actual withdrawals with expected number based on exposed to risk
- Look at the impact of any unusual events (e.g. redundancy exercises)

[3]

[20 Marks]

Solution 8:

i) Key assumptions will be

1. morbidity rates,
2. mortality rate
3. investment return,
4. expenses both initial and maintenance including claim related expenses
5. The cost of underwriting which could be high for this product needs to be grossed up for the proposals which could get rejected but still cost the company
6. Policy lapses
7. Impact of selective withdrawals
8. Risk discount rate

The morbidity rates can be derived using the morbidity rates
provided by reinsurer,
industry experience,
public disclosures of competitors,
experience from other countries

The base data used may need to be adjusted for the target market and underwriting criteria

Set profit criteria- The Company will want to maximize profit or at least meet the defined target level of profit

Could be a combination of net present value, IRR or payback period

Margins of prudence that need to be built in various parameters especially depending on the level of uncertainty of the parameter and those to which profitability could be highly sensitive

Ensuring consistency between assumptions like investment return and inflation

Make appropriate allowance for taxation

Expected business volume and average SI size which would impact profitability

Extent of cross subsidy between different policies or business mix

Comparison with competitors premium rates

Would need to conduct sensitivity analysis on the profit test to key assumptions

[8]

ii) Monitoring aspect would comprise –

1. Experience analysis of critical parameters at granular level
    a. The assumptions and the actual emerging experience should be compared on regular basis
    b. It becomes important to monitor morbidity experience since it is a reviewable premium contract
    c. Need to see the volume and the mix of business is as expected

2. Reasons for variance of any parameter
    a. Is it due to target market being different
    b. Pricing issues - parameter errors
    c. Controls like underwriting not as effective as expected
    d. Operational issues or fraud

3. Financial consequence of variance- impact on solvency and P&L results
    a. It will be necessary to understand at granular level the sources of profit and losses particularly with regards to expenses and morbidity, for example reasons for anti-selection if present and impact on solvency

4. Effectiveness of controls- underwriting –initial and claims, reinsurance programs if any
    a. Analysis of claims experience by policy duration to understand effectiveness of initial underwriting
    b. Cost vs benefit analysis of underwriting limits set
    c. Cost vs benefit analysis of reinsurance
    d. Benchmarking against competition to understand impact on sales volumes and selection of current standards

Feedback to the management needs to be provided so that necessary action can be taken timely for example strengthening underwriting for the product, better claim management or controlling any sales costs/overrides, sales controls etc.

Any steps taken should be in consideration of the relevant economic and commercial environment

[6]

iii) Policyholder

The policyholder may be able to get coverage cheaply as compared to guaranteed rate

Availability of cover if insurers are not prepared to write the cover on guaranteed rates

Insurer

It may be the best structure available for new, innovative products

Reduced risk may lead to reduced capital requirement for the insurer

[4]

iv) Medical underwriting

Designing a simple and well thought through health declaration/proposal form to capture relevant health related information and as a trigger for additional underwriting requirements

Having a conservative underwriting grid

The impact on costs and sales due to inconvenience caused by underwriting needs to be considered

Having well trained underwriters and systems in place

Empanelling reputed medical agencies/hospitals to perform medical tests, if required

Policy on declining and postponement of cases

Financial Underwriting

Requesting relevant documents for profile verification like Aadhar etc.

Develop expertise to spot any fake documents

More stringent underwriting based on the customer profile for example certain occupation or geographical areas

Data sharing with other insurers regarding individuals who have made fraudulent claims in the past or being a member of such industry fraud panel

Life style underwriting to understand when SI sought is in line with income from all sources and lifestyle

[5]

[23 Marks]

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