Institute of Actuaries of India

Subject SA1 – Health and Care Insurance

September 2018 Examination

INDICATIVE SOLUTION

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 prime objective of the ALM policy of ABC is to derive the optimal asset allocation strategy in to various classes of assets so that the combined risks undertaken by the company through its liabilities and assets jointly, in terms of nature, term & currency are within the risk appetite of the company. The term optimal indicates the strategy which maximizes the expected profits from the portfolio keeping the risks within the tolerance limits.

It is important that the objectives of ALM policy cannot be determined in isolation but necessarily it should be derived for the combined portfolio of assets and liabilities.

The main uncertainties of the liability profile are the timing and amount of liability outgoes which are guided principally by the term, nature and currency of the liabilities undertaken.

Apart from domestic business, ABC has overseas operations and hence currency is an important factor to consider. Also, ABC may have some overseas service providers like consultants, software license, hardware etc. which requires payments in foreign currency, adding further risk potential from currency.

By writing both short & long term business, ABC introduces considerable risks with respect to terms of the liabilities.

Its liabilities are classified in the following 4 categories by nature:

- guaranteed in monetary terms – CI
- guaranteed linked to a prices index or similar – Expenses, IP
- Indemnity – PMI, LTCI
- investment-linked – ULIP

Hence, it introduces significant risks with respect to nature which has to be managed by way of investments in consistent asset classes.

One important point to note that ALM does not require exact matching of assets & liabilities but it introduces the consciousness due to the mis-match by way of various risk measures.

Therefore, the objectives may be summarizes as realizing the risks due to the possible mis-matching of assets & liabilities and hence adopting the strategy which maximizes the expected profits of the business keeping the risks arising within the tolerance limit of the company. [5]

ii) The process involved in deciding ALM strategy of ABC is:

- Classify each components of its liabilities in one of four classes as mentioned above – by nature
- Further classify it by terms, viz the durations of each liabilities
- Further classify it by currency, viz domestic or foreign currencies
- Identify the basic parameters under each cell along with the respective distributions

- Start from an arbitrary (intuitive) asset allocation
- project liability outgo & asset proceeds in each future time period under each cell above along with the possible risks measures
- Combine the results with suitable method to provide expected profits & combined risk scores allowing for all possible correlation among the parameters & risk metrics.

Repeat the above process for all possible asset allocations to have a series of expected profits and associated resultant risk metrics.

Decide the optimal strategy which gives highest expected profits and the associated risks are within the tolerance limit of the company.

Among other things, the most important factor which decides the risk tolerance limit of the company is the capital (free assets) that the company holds. Higher the capital, higher the risk appetite of the company, all other things are equal. [5]

iii) The basic features of the policyholder's fund arising out of the policyholder's liabilities are:

Uncertainty

There is high level of uncertainty of the timing and amount of the outgo, with occasional large unexpected claim payments (e.g. major epidemics or medical costs) are associated to it.

Term

Some health and care liabilities are very short term (for example, PMI), i.e. to be settled within the next year or so. However, for most other classes the liabilities stretch into the medium and long term.

Nature

Health and care insurance claim liabilities are generally one or other of

- guaranteed in monetary terms
- guaranteed linked to a prices index or similar
- Indemnity
- investment-linked.

For liabilities guaranteed in monetary terms, there is no uncertainty in the individual amounts payable, only in the frequency of those amounts (e.g. the number of critical illness claims). So, bonds (both G Sec & corporate) of appropriate terms and currencies may be considered to support the liabilities.

For liabilities guaranteed in terms of an index of prices or similar, there is uncertainty as to the future values of that index. Such liabilities with short to medium terms may be supported by suitable index

linked bonds and the long term liabilities may be supported by equities or index linked bonds. Appropriate derivatives may also be considered to support the liabilities.

For indemnity (e.g. PMI), both the amount and frequency of future claims are uncertain and dependent on the costs incurred in receiving treatment covered by the policy, which in turn is prone to inflationary influences. (So this is similar to an index-linked liability.) Due to its shorter term (less than 1 year), cash or money market investments may be considered as supporting assets.

For investment-linked products, the (unit) outgo is directly determined by the value of the investments underlying the contracts and so, the investments should be as per the investment mandate of the funds.

The treatment of inflation-linked liabilities depends on the term of the claim outgo:

Where the claim payments are due within the next year, unexpected inflation will not be a major problem. First, there is not long for inflation to affect the liabilities. Secondly, inflation over the next year is unlikely to deviate much from the expected value. Therefore, for very short-term liabilities subject to inflationary increases, the liabilities are often taken to be fixed in monetary terms. Therefore, cash or money market will be appropriate investments here.

Where the claims payments are likely to stretch several years into the future, then inflation is likely to be a major consideration. Supporting investments in bonds (Gsec & corporate) may be considered here.

Currency

Liabilities of ABC are likely to be dominated in Indian currency. However, significant overseas liabilities are there as the insurer underwrites overseas risks and due to overseas service providers. Appropriate investments in overseas bonds (Gsec, corporate or index linked) may be considered here. The overseas service provider's fees are subject to inflation and so may be backed by index linked bonds or equities of overseas market.

Expenses

Liabilities for expenses in respect of the business already written are for the expenses of servicing that business, e.g. handling claims & servicing the policies. These expenses will be:

- less uncertain than claims
- subject to inflation, predominantly wage inflation
- Both in Indian and overseas currencies

Expenses are subject to inflation and hence may be supported by bond, index linked bonds or equities with suitable combinations.

Liabilities denominated in a particular currency should be matched by assets in the same currency, so as to reduce any currency risk.

There may be restrictions on:

- the types of assets that the insurance company can invest in (both prescription and prevention of holding certain assets)
- the amount of any particular type of asset that can be taken into account for the purpose of demonstrating solvency
- restrictions on the maximum exposure to a single counterparty / country
- the amount of mismatching, e.g. a requirement to match assets and liabilities by currency; there may also be a requirement to hold a mismatching reserve
- custodianship of assets
- the investment assumptions used to value the liabilities.

IP claims could be either, although earnings inflation is perhaps more likely as any indemnity link (e.g. through benefit limitation) usually links to salaries. Any escalation of benefits will be detailed in the policy. Suitable combination of investments in bonds (Gsec, corporate & index linked), cash & equities will be appropriate here.

CI policies that pay a lump sum will usually not have any link which may be supported by bond investments. If the lump sum is inflation-linked, then the link will be specified in the policy and may be supported by index linked linked bonds, equities or derivative investments . If income benefits are paid, then again the escalation rates will be detailed in the policy and could be linked to either (or neither) index.

PMI claims will escalate mainly with medical costs, which can be quite different from both RPI and earnings inflation escalation (higher or lower). Claims costs also change for other reasons in particular, new treatments and technological advances leading to reduced treatment times. Cash and money market investments are appropriate supporting investments for this case.

Long-term care costs will escalate with costs of care provision (mainly salaries) and housing / living, and so might be a mix of the two indices. Due to long term nature of the liabilities appropriate combination of bonds & equity investments are suitable here. Even property investments may be considered here subject to the associated shortcomings like size, liquidity, administration etc are take care of.

The unit fund of the Unit linked policy must hold the assets according to the published investment mandate of the fund. The non-unit fund is likely to be insignificant and short term and hence it may be better matched by cash investments.

Any excess assets in policyholder's fund (portion of free assets) may be invested in riskier investments like equities however its amounts are likely to be insignificant. [15]

iv) The first shareholder's fund supports the 150% of the required solvency capital. So, it is the additional cushion for protection of policyholders' interest which ensures the promised benefits to policyholders in case of adverse scenarios. As per Indian regulatory stipulations, the assets are valued on the basis of amortized book value for bonds and money market instruments, lower of book value and market value for equity & properties. Therefore, the equity / property investments are subject to market volatility to a large extent. Any drop of values of the assets in this fund has to be funded immediately from the other shareholder fund and indicates a drop in solvency margin overall. The above observations recommend that this fund should comprise of assets which are stable in value that is money market instruments and Securities.

Also, the quantum of required solvency margin is a function of policyholder's liabilities even when RSM is linked to premiums or claims (for short term liabilities like PMI) as these two have a strong positive correlation. So, the asset values in this fund also should have a positive correlation with the policyholder's fund value. This suggests that the investment of the first shareholder's fund should be in line with the policyholder's fund.

For the longer term liabilities, the values of the liabilities increases using lower discount rate for valuations and vice versa. The lower discount rate for valuation arises as a result of holding higher equity investments in the policyholder's fund due to low dividend yield. Holding equity in the first shareholder fund will aggravate the problem further in case of market fall.

The unit account of the unit linked fund will require corresponding 150% of RSM to be held in this fund. This component should move in line with the unit fund and hence should follow the same asset distribution as the unit fund mandate.

So, in summary, the portion of the fund which supports 150% of RSM of:

- Unit fund – should follow the investment mandate of unit funds
- The shorter term liabilities – should follow the same asset mix as the supporting policyholder's funds
- The balance – Securities (bond). G-sec and corporate bond segregation should be to minimize default risk. That is dominated by G-Sec investments.

The second shareholder's fund does not have such obligation and therefore its target should be to maximize return within the risk framework. This fund should go for higher investments in equity and property (if size permits) in order to achieve higher expected return subject to being within the risk tolerance limit of the company. [6]

v)

a) <u>Morbidity experience</u>

Morbidity claims are investigated by incidence and claim cost. Although there are similarities in approach, each product type will be considered separately.

The following approach should be considered for the respective products:

PMI and health cash plans

For PMI and health cash plans there are various levels of investigation, namely:

- by product type
- by distributor / sales channel
- by provider / hospital
- by medical procedure or policy benefit section
- by age
- by gender
- by occupation / annual income (if known)
- by region / area of residence
- by duration from entry
- by NCD level (if appropriate)
- by member cost-sharing, e.g. excess levels
- by underwriting method

Critical illness insurance

Incidence rates will be examined at the portfolio level and subdivided into the areas for analyses in a similar manner to those used for medical expenses, above, although hospitals / providers and NCD level will not be relevant. The cause of claim will be one of the key factors to investigate and care must be taken in establishing "true cause". This may be difficult when several diseases are present at the time of claim or may not even be recorded when a policyholder dies with an accelerated CI contract.

Income protection insurance

For income protection insurance, there are various levels of investigation, namely:

- by product type
- by distributor / sales channel
- by age
- by gender
- by occupation / Income level (if known)
- by region / area of residence
- by duration from entry
- by deferred period.

Recovery rates will also need investigation:

- by duration
- by age
- by gender
- by incapacity
- by replacement ratio.

For IP insurance contracts the portfolio is often considered in two parts: (a) new claims (b) the existing claim portfolio.

For new claims, there will be an investigation by incidence and expected claim cost (the disability annuity reserve assigned by the insurer to new claims, using the appropriate mortality and morbidity tables).

For the existing claim portfolio, the investigation will review the actual experience against the expected experience using the mortality and morbidity tables used by the insurer.

Again, the size of the portfolio and credibility of data will indicate the level of analysis.

Long-term care insurance

Two types of contract are considered here: (a) pre-funded (b) immediate needs annuities.

Pre-funded contracts

In theory pre-funded contracts should be investigated in a similar manner to contracts discussed above. The incidence of morbidity will be determined by contract sub-division. The claim cost, expected and actual will also be determined by the same contract sub-division (benefit category).

Due to small business volumes (likely) most investigations can only be carried out with a few data sub-divisions, e.g. gender and broad age bands.

Exposed to risk

For all health and care insurance contracts, particular care will need to be exercised to ensure that only lives insured in the investigation period under consideration are included in the figures. It is equally important to ensure that claims are correctly included.

Adjustments to exposed to risk will need to be made where the life exposure only contributes to part of the period under investigation. As data are largely computerized, adjustments can be made on a life-by-life basis using the date of entry and / or exit from the investigation.

Further adjustments will need to be made to the exposed to risk if the life insured is subject to an initial period where no claim can be made (waiting period).

Claim amount

Claim amounts, even when these are fixed in the contract, also need monitoring.

Monitoring should also be carried out on the same regular basis as described above to consider the variation in claim by amount. For contracts with pre-chosen fixed benefit levels, this will entail analyzing the claim frequency to discover whether there are significant differences in claim inception rates by level of sum insured chosen. Such differences may reflect anti-selection or may reflect the levels of underwriting to which policies at different levels of benefit are subject.

For contracts with indemnity benefits, the analyst will need to investigate claim amounts differently. Here the average size of benefit payout, subdivided into as many categories as there are separate incidence rates, will be researched.

PMI and health cash plans

PMI is written on an indemnity basis so the amount insured is the same for everybody in the policy class, i.e. everyone is generally entitled to a full refund of costs, subject to exclusions. However, there are likely to be some variations within the policy classes in that larger policy limits (e.g. maximum outpatient benefit level) will give rise to higher average claim amounts.

In analyzing average claim amounts under PMI, it is necessary to examine the experience, broken down into suitable categories. The costs of all the major diseases and procedures will be investigated (separately).

These may be further sub-classified, depending on available data, by:

- inpatient, day case or outpatient
- type of hospital
- source of distribution, e.g. broker, tied agents, bancassurance or direct sales
- geographical region
- policy type
- presence of pre-agreed fee schedules.

The analyst would focus particularly on whether new procedures, drugs or equipment were being used to treat illnesses differently than formerly. This will have a major effect on average costs.

The effect could be upwards or downwards. For example, a new drug may rapidly improve the recovery time of certain illnesses, but may cost considerably more to produce.

For health cash plans, monitoring of the experience by claim amount needs to be undertaken, for example to determine whether policies with higher (or lower) payback percentages experience different incidence rates from the overall average.

Long-term care insurance

Where contracts provide cash for care there should be no variation by claim amount.

This is because the cash benefit would be for a fixed amount.

However, economic factors may be relevant in that claimants with large sums assured will often reside in the areas of high-cost long-term care. This could produce a regional bias in claims, i.e. incidence may not differ greatly; but some regions will be linked to policies with higher benefits insured and hence a higher total claims payout, other things being equal.

If the benefit design indemnifies the claimant for certain aspects of his / her long-term care costs up to stated benefit limits, the insurer's experience is subject to volatility (although this is capped). The analysis of claims by amount is thus crucial in the assessment of the profitability of the business, in reserve setting for ongoing claims and in the reassessment of the current premium basis.

Overall:

Finally, the findings of the analysis have to be quantified as each has financial impact on the profitability. Apart from the direct impact on claim outgoes, the findings of the analysis may impact other areas, viz. IBNR, RBNS, and PDR etc. A consistently higher claim outgo than provided in the pricing may invite additional PDR. A consistent trend in reporting delay will change the IBNR assumptions. A consistent over/under inflated claim pattern may change RBNS assumptions etc. Therefore, along with the immediate impact on the revenue account, there may be change in provisioning method as a result which further impacts on the financials of the company.

Lastly, each of the above analysis should be conducted on with and without Reinsurance basis to disclose separately the gross and net (of reinsurance) impact on the profitability of the company.

[9]

b) Renewal.

Possibly the distribution channel, duration since inception and product type will be the most important factors to consider. At the pricing stage, assumptions are made for renewals to distribute higher initial expenses over the expected lifetime of the policies. It is necessary to analyze the experience to validate the assumptions and to change it, if required. The analysis should be done separately for short term (PMI) and long term policies as the assumptions & impacts are very different. For short term policies, Renewal rate = No. of renewals happened during the period / No. of renewals invited in the same period. For longer term policies, Renewal rate = No. of renewals happened during the period / the corresponding exposed-to-risk.

Apart from the factors mentioned above, it can be further classified according to the following:

- particular distribution channels or subsets thereof
- geographical area

- policy size
- benefit type
- yearly cohorts

To compensate for lower renewals, the company may have to target for higher new business and hence lower profits / loss. Also, selective renewals may impact the morbidity experience and hence profitability. [2]

c) Expenses

The insurer needs to monitor the actual expenses incurred against the expected level. This could be undertaken on the portfolio on a monthly basis. More detailed investigations for elements of the portfolio should be undertaken from time to time, coinciding with the accounting reporting timings. These detailed investigations will include: (a) expenses allocation between fixed and variable (b) product contributions against expenses incurred.

Expenses allocation between fixed and variable

It is necessary to collect expense information split between fixed and variable. The expenses should also be sub-divided between initial, renewal, claim, termination and investment.

Product contributions against expenses incurred

The relationship between the expenses incurred and the contributions to expenses from within each product should be examined on a regular basis. The results need to be incorporated into the pricing and reserving bases of the products.

Due allowance must be built into various health and care insurance contracts for the effect of inflation on expenses.

Higher expenses than expected will reduce the profit and this will be reduced further if there is a change in assumptions in valuation as a result of the consistent experience trend and vice versa. The two impacts on profits should be shown separately along with the reasons as revealed by the analysis. [3]

d) New Business:

There is no assumption about new business in the earlier valuation of the company. However, there was a new business assumption in the business plan of the company. It is expected that new business will have new business strain due to uneven distribution of expenses and higher level of prudence incorporated in the valuation basis. New business strain arises as the initial premium net of initial expenses is lower than the reserving requirement. At the same time, any new business will require additional capital support.

The new business strain will vary according to product type, distribution channel, ticket size, premium frequency, level of cross-subsidy, geographical distribution etc. Similarly, the capital requirement will vary in a consistent manner. Therefore, the analysis of new business must be performed to assess whether the growth is according to the plan and the level of costs associated to this. There is substantial difference in expected profitability in various segments of business and hence it is necessary to have new business balancing NB strain, capital & profitability. Apart from these there may some other objectives related to market share and other indices perceived by the market (analysts) or internally (developing a new distribution channel). A business plan must be there which balances each of these suitably.

NB from each of the segments have to be analyzed from the above objectives used for planning business strategy of the company and to be combined together to assess the overall impact on the company.

It is expected that new business will post an immediate revenue A/C loss by the company along with increase in required capital lowering the solvency position of the company. This has to be communicated with sufficient clarity to reveal the actual meaning of this. Additional information like the expected profits etc. may be provided internally to remove any confusion. [3]

e) Invest Income:

The insurer needs to monitor the actual investment income received (after allowing for capital movements) against the expected level. The significance of investment income will vary by contract, e.g. significance for PMI is low, whereas for IP insurance it can be very important due to the size of the claims reserves. The analysis would be split by investment class and, where appropriate, would include dividends, interest and capital gains (realized and unrealized). The analysis would be performed both gross and net of investment expenses.

As for the other experiences, any deviation from the assumed will have immediate impact on profits and if the observed experience trend leads to change in assumption for valuation, this has further secondary impact which is usually much higher than the immediate impact.

[2]

vi) In addition to the requirements stipulated in Guidelines on Group Health Insurance Policies Vide Circular Ref.? No: 015/IRDA/Life/Circular/GI Guidelines/2005 dated 14/07/2005 issued by the Authority as amended from time to time, all Group Insurance Policies shall comply with the following norms:

1) Subject to the minimum number prescribed in Regulation (7) of HIR, 2016 every Group Health Insurance Product shall specify the minimum group size for offering Group Health Insurance Policy.

2) No Group Insurance policy shall be issued to a group whose size is less than the minimum stipulated expecting that the group would reach that size in future over a period of time.

3) The policy term of every group insurance policy shall be as stipulated in HIR, 2016. Where the Group Insurance Policy is open for the entry of members at periodic intervals say every month or every quarter, though the duration of the Group Policy may be beyond the policy term stipulated in HIR, 2016, the insurance coverage for every member of the group insurance policy shall not exceed the maximum policy term stipulated in HIR, 2016.

4) Subject to maintaining the minimum group size and the maximum policy term stipulated in HIR, 2016 Insurers may issue multiple group insurance policies in tranches to the Group Organizer for providing insurance coverage to the new members on an ongoing basis.

5) The underwriting/rate review process of the group policies at the time of renewal should consider the member entry and exit patterns from the group in order to address the possibility of adverse selection, moral hazard or fraud.

6) Subject to portability norms stipulated in HIR, 2016; persons, who join a group insurance scheme shall, on their leaving the group as per group rules, be provided an option to migrate to another policy at the premium as applicable for such individual insurance, with all benefits of portability. It should be facilitated both by the group organizer and the insurer concerned.

7) A master policy is to be issued to the group, which should be available for guidance of the members covered. Subject to the extant Guidelines on Group Insurance all members should be issued a Certificate of Insurance giving the details of the benefits and the important conditions and exclusions.

8) All discounts should be based on valid underwriting considerations, taking into account the loss experience of the group, the expenses including commission that may be incurred / payable.

9) Insurers must justify the rates and terms offered to any group to the Authority, if called upon to do so.

10) All insurers wishing to offer group insurance should have a Board approved group insurance underwriting policy which should be part of the underwriting policy filed with the Authority. The policy should spell out the manner in which its risk and costs are analyzed and factored into the premium cost. All risk factors per units of coverage such as individual, family, group floater, etc. should be separately analyzed and priced. Past experience and future exposures should also be critically analyzed for large groups. Explanatory Note: Large Group for the purpose of these Guidelines is a group extending coverage to over and above 500 members.

11) Pricing is to be made based on sound actuarial principles, supporting data considering all the relevant aspects of pricing such as morbidity experience by gender, by age group, by occupation, by group size etc, expenses, terminations, profit margin etc. Discounts and Loadings offered shall be based on objective criteria with appropriate justifications. For innovative covers, Insurers shall base the pricing prudentially on the relevant morbidity experience which reflects the future expected experience from such innovative covers apart from considering other parameters.

12) All group health insurance policies having named beneficiaries should have ID cards issued to the beneficiaries to enable them obtain cashless service, wherever applicable.

13) Unnamed policies e.g. Personal Accident may also be issued provided the group has non-tamperable registers or records or procedures to identify the member insured / covered. The registers, records or the procedures shall be subject to inspection at any time.

14) As part of the Terms and Conditions of the Group Insurance policy the Insurer shall put in place enabling provisions to let the beneficiary or the insured member directly raise grievances either with the insurer or with other Grievances redressal mechanism available. The granular details in this regard shall be part of the terms and conditions mentioned in the Certificate of Insurance.

15) The group administrator's role as facilitator in offering a group cover and facilitating insurance services including claims from a central point needs to be clearly spelt out between the group and insurer as part of the Terms and Conditions.

16) The insurer and the concerned Insurance Agent or Insurance Intermediary, if any, will be held responsible for any malpractice in respect of the Group Policy that is detrimental to the beneficiary members or potential consumers or to the public at large and for violation of any regulation or guidelines of the Authority relating to the insurance transactions with groups.

[10]

[60 Marks]

Solution 2:

i) The key objectives of risk based solvency regime are follows:

a. Protect policyholders interest
b. Introduce capital requirements that are appropriate to the risks being undertaken
c. Provide appropriate incentives for proper risk management
d. Improve the level of disclosures to ensure greater transparency in risk and capital assessment of companies
e. Improve investor's confidence

The guiding principles of risk based solvency are a combination of

- Minimum capital standards
- Qualitative risk management requirements
- A well-defined and rigorous review process of companies' solvency by regulators
- Prescribed disclosures to supervisors, policyholders and investors

The overarching objective is to have a modern and prudential regulatory system [5]

ii) The risk margin is a part of technical provision. it is the additional amount needed to ensure that the technical provision (i.e. best estimate liability and risk margin) represents the amount that would be payable to transfer the obligations to another party.

Risk margin represents the cost of holding capital to support those risks that can't be hedged. These include all insurance risks, reinsurance credit risk, operational risk and residual market risk.

For example, the insurance risks are

- Expenses higher than expected
- morbidity / mortality higher than expected
- Adverse withdrawal experience

Similarly, there are operational risks that can't be hedged. If any part of the business is reinsured then the reinsurance credit risk also needs to be considered.

Residual market risk will arise if the assets and liabilities are not perfectly matched.

The cost of capital method of calculating risk margin involves following steps:

- It requires a projection of the future capital that the company is required to hold at the end of each projection period during the run off the existing period.
- As mentioned above, the projected capital requirement is a subset of the SCR consisting of those risks that can be hedged in the financial markets.
- These projected capital amounts are then multiplied by a cost of capital rate. The rate is usually decided by the insurance regulator and is applicable to all insurers.
- The product of the capital rate and the capital requirement at each future projection point is then discounted using risk free discount rates to give the overall risk margin

[6]

iii) Following aspects need to be considered while deciding the appropriateness of Standard formula or internal model:

- Nature of business
- Existing models
- Capital requirements
- Complexity
- Internal model approval process
- Resources

- **Nature of Business**
  If the approach used in the standard model is a good fit to the company's business then it makes sense to use it as this will save considerable resources in developing an internal model. Having said, an internal model might be appropriate if the risk profile of the business differs materially from the that covered by standard formula. In such a situation, the internal model is likely to provide a more accurate picture of the capital actually required for the business.
  Further, an internal model could allow for special features of the business that are not covered by the general approach used by standard formula

- **Existing Models**
  An internal model be appropriate if the company already uses similar models for risk management for the decision making process. Adjusting existing models and processes to be suitable for internal model could be easier for the company and less resource intensive.

  If they don't already exist then developing them may have wider benefits for the company and may provide a competitive edge over competition

- **Capital Requirements**
  The use of internal model could lead to less onerous capital requirements than if the standard model was used. This is because the internal model could demonstrate higher benefit of diversification within the business.

  A lower capital requirement has many benefits for the company. Firstly the shareholders need to invest less capital to support the existing business and this leads to a higher return of capital. Secondly, the capital that would otherwise be tied up backing the SCR is now released for other purpose.

- **Complexity**
  The standard formula calculates the SCR using standard prescribed stress tests or factors, which are then aggregated using prescribed correlation matrices.
  To use an internal model the company must use/ determine its own stress and method of aggregation
  So, the internal model is more complex approach that requires more decision to be made and a greater amount of analysis to be performed.

- **Internal Model approval process**
  An internal model must be approved by the regulator before it can be used to calculate the SCR
  The insurer will need to put considerable effort into passing the tests required by the regulator for approval. There is a possibility that company may be asked to rework on some of the aspects that may delay the approval process
  The quality of data and assumptions required to use an internal model may become an issue. The historic data available to calibrate extreme events may be limited or not fully credible.

- **Resource constraint**
  Developing an internal model, checking it and getting it approved by authorities and subsequently maintaining it will increase the cost burden of the company
  The major cost is likely to be the staff time developing, documenting and running the models
  There will also be cost of purchasing the software and hardware that will be required for the internal models

  The company must balance the benefit from using an internal model with its cost.

[9]

iv) Following tests Internal Model must pass to get approved

- Use test
- Statistical quality standards test
- Calibration tests
- Profit and Loss attribution
- Validation tests
- Documentation standard

- **Use test**
  Insurers will have to demonstrate that the internal model is widely used throughout all relevant areas of business and that it plays significant role in the areas of
  - Internal governance
  - Risk Management
  - Decision making
  - Capital allocation process
  - Economic and solvency capital assessment

- **Statistical Quality Standards**
  The internal model must meet a minimum quality standards relating to assumptions, data including
  - probability distribution forecasting,
  - the use of expert judgment,
  - Morbidity consideration
  - Method of risk aggregation

- **Calibration Standards**
  These standards aim to assess whether the SCR derived from the internal model has a calibration equivalent to the Value-at-Risk at 99.5% confidence over one year

- **Profit and Loss attribution**
  It includes requirement to demonstrate how categorisation of risk chosen in internal model will be used to explain the causes and sources of actual profits and losses

- **Validation tests**
  It is to ensure that the internal model has been fully validated by the insurer and must be subjected to regular control cycle reviews including testing results and emerging experience

- **Documentation Standards**
  The design and operational aspects of the internal model must be clearly and thoroughly documented and meet the minimum standards set by the regulator.

[6]

v) An insurer can obtain financial assistance via reinsurance arrangements. Following are the ways in which insurer can use reinsurance for meet financial requirements, although all fundamentally involve an initial transfer funds from the reinsurer to the insurer.

- **Financing of new business strain**
  The insurer can use finance from the reinsurer to fund new business strain. This will enable the insurance company to write more new business. This is usually done by using proportional reinsurance

  Under proportional reinsurance, the solvency capital requirements normally reduced in proportion of the business ceded, though there may be a limit specified by the regulators.

  Quota share reinsurance is most preferred form of proportion reinsurance for these deals

  The insurers usually spend a big upfront cost for acquiring a new policy. In some cases, the outflow in the first year is significantly higher than the premium income. In such a scenario, reinsurance commission may be available to factor future surplus streams i.e. lend now against the predicted future flows of premiums less expenses and claims.
  However, if the policy lapses then the insurer loses the opportunity to recoup the expenses and so will be unable to pay the reinsurer for the money received. Reinsurers may be unwilling to take such risks and may insist of commission clawback should the actual experience is not in line with expectations.
  The terms will be clearly stated in the reinsurance arrangement

- **Solvency**
  Financial reinsurance arrangements are used to improve the regulatory balance sheet by crystallizing the value of future expected profits. However, the effectiveness of the arrangement may depend on the risk based solvency regulations. If any funding received by the insurer creates a liability on the balance sheet then the arrangement is not useful for the insurer as assets and liabilities on the balance sheet will increase by the same amount.

  However, the regulatory solvency requirements allow for reinsurance while calculating the capital requirements. So reinsuring a part of the risks (morbidity), the insurer may be able to reduce the capital requirements

- **Take-overs**
  The acquisition of an insurance company might be facilitated, where a subset of business (or all policies) within the company being acquired is identified as potentially profitable in the future, and the reinsurer is prepared to advance funds in anticipation of this future profit.
  The reinsurer would pay an initial commission, after which the reinsurer would be entitled to (a proportion of) the future surpluses arising on this portfolio for as long as the arrangement remained in place.
  In these circumstances the reinsurer is again taking the lapse risk.

[8]

vi) Information that may be required as follows:
- Valuation report
- Surplus analysis
- Appointed Actuary's report

- Peer review report
- Annual returns and accounts
- Published EV calculations, if the seller is a listed entity
- Minutes of board meetings,
- Terms of reference of internal risk management committee
- Risk Management reports
- External and Internal Audit reports
- Policy documents with details of options and guarantees
- Board approved Underwriting policy
- Claims philosophy

In the second part, the candidate is expected to answer how the adequacy of capital will be established by using the information sought above. [6]

[40 Marks]

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