

# **Institute of Actuaries of India**

## **Subject SA2 – Life Insurance**

### **October 2015 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) Company B has previously submitted an indicative, non-binding bid for acquiring Company S. Such an indicative bid would typically reflect certain high level assumptions based on either publicly available information such as quarterly public disclosures or initial information memorandum (IM) as may be provided by the seller.

During a formal due diligence, the potential acquirers have access to more detailed information from the target company. As such, the Company B would aim to develop a more insightful understanding of the Company S's business by dissecting the high level information as reflected in the public disclosures and IM. For instance, while the public disclosures may give a fair sense on the expense and persistency experience at a company level, the experience of the tied agency and bancassurance channel may be materially different.

Company B's key objectives of a formal due diligence will be to validate the reasonableness of the high level assumptions underlying the indicative bid and to identify appropriate adjustments to firm up the valuation.

In addition, the Company B will also aim to identify any potential red flags which may jeopardize the deal – examples would include any major compliance or taxation issues; presence of any material product line for which the Company B does not have appetite to manage (e.g. life annuities); risks faced which may not be transparent in the public disclosures or IM etc. The aim of Company B in identifying these would be to reflect the same appropriately either in the revised valuation of Company S, or by seeking appropriate legal protection.

Company B would aim to gain a deeper understanding of the softer aspects of Company S, such as the quality of its management etc. **[3]**

ii)

**Products/pricing**

The various aspects that would be covered in the actuarial due diligence of Company S, relating to its products / pricing area are set out below:

- 1) Whether Company S has appropriate documentation of the 'File and Use' applications approved by the IRDAI, including all the approval letters and any other relevant regulatory correspondence.
- 2) Whether the products sold are in accordance with the 'File and Use' finally approved by the IRDAI:
  - review audit reports from any periodic audits performed in this regard
  - review policy documents, system testing reports prepared at the time of new product launch for certain key products
  - evaluate whether Company S has systems in place to administer the products written. For product features that are not yet implemented in the administration system (e.g. loyalty additions paid after 10 years, or non-negative residual additions in case of unit-linked products etc.), review Company S's plans for implementation.

- 3) Understand Company S's internal governance structure relating to new product development:
  - Does Company S have an internal committee of senior management to review/approve new products before filing with the IRDAI?
  - Does Company S have a product development/pricing policy that sets out the pricing philosophy, profitability targets, approach for competitive positioning for new products etc.? Review if available.
- 4) Develop an understanding for the key products (both - currently sold and withdrawn) by Company S:
  - For without-profits products: Review the underlying guarantees vis-à-vis competition products. Identify any products that offer significantly generous returns compared to competition. Assess if the guarantees are likely to be onerous.
  - For with-profits products: Review the underlying guaranteed returns and illustrated non-guaranteed returns. Identify any products that offer significantly generous returns (both guaranteed and total return basis) compared to competition. Assess if Company S is likely to be able to meet its policyholders' reasonable expectations (PRE) in respect of non-guaranteed bonuses.
  - For unit-linked products: Identify any products that offer a guarantee; if so, understand how these guarantees are managed in practice.
  - For protection-oriented products: Review the premium rates vis-à-vis competition. Identify any products that are significantly cheaper than competition. Identify if products offer any options which could be potentially anti-selective.
- 5) Understand the profitability metrics for various products, particularly all key products (e.g. those contributing >5% to new business premiums):
  - review any sensitivity analysis performed at the time of product pricing to understand key risks in various products
  - whether the profitability metrics continue to remain relevant for older products
- 6) Review the product strategy of Company S:
  - Review current product mix, historical trends, and future plans separately for each distribution channel
  - Does Company S sell any *tactical* product - highly competitive but with low (or negative) profit margins - to boost sales in the short term? If so, evaluate the Company S's ability to withdraw this without causing a major business disruption.

[5]

### **Statutory reserving / solvency**

The aim of the due diligence will be to ascertain the adequacy and accuracy of the calculations and compliance with the IRDAI regulations the applicable professional standards. The various aspects that would be considered in the due diligence of Company S are set out below.

#### *1) Data*

Review the data checks performed by Company S to ensure that the valuation data is complete and accurate and reconciles with the previous valuation data.

Examples of such checks could be:

- performing movement analysis on the valuation data by reconciling in-force business at the valuation date against the in-force business at the previous valuation date and the new business, claims, surrenders etc. during the period
- performing completeness checks on the movement data by comparing the same against the records maintained by other departments
- for the unit-linked business, ensuring that the unit balances from the valuation data reconcile with the unit balances as per the investment systems
- performing accuracy checks on the policy data on sample basis, identifying and correcting null values, illogical data points etc.

## 2) *Valuation Method*

- Whether Company S uses the Gross Premium Valuation (GPV) method for valuation of liabilities in case of traditional products? If any other method (such as unearned premium reserves method in case of protection products) is used, has Company S ensured that the reserves are not lower than that derived using the GPV method?
- Are the reserves calculated on a policy-by-policy basis?
- To ensure that for unit-linked products, the non-unit reserves, at a policy level, have been floored to zero. To ensure that for the traditional products, the reserve for a policy is not less than the total (i.e. higher of guaranteed and special) surrender value.
- For unit-linked products, is the fund value fully reserved for notwithstanding any surrender charges that may be applicable?
- For the with-profits business, are the future policyholder bonuses appropriately reserved for, in line with the PRE? For the with-profits business, does the reserve reflect an allowance for future profits to shareholders and future taxes?
- Are there any arbitrary changes from one year to another?
- Does the reserve allow for aggregate provisions (if necessary) in respect of:
  - Substandard lives, AIDS pandemic
  - Cost of options and guarantees
  - Lapsed policies within the revival period
  - Expenses in case of new business discontinuance scenario

## 3) *Valuation Basis*

- Valuation basis should reflect a sufficient degree of prudence. Evaluate reasonableness of prudential margins having regard to the APS-7.
- Are the mortality and morbidity rates based on the company's own experience (if sufficiently credible) and expressed as a percentage of the prescribed industry table? Has the company allowed for future improvement in annuitants' mortality assumption?
- Are the maintenance expenses reflected in the valuation based on the actual expenses of the company based on a recent expense analysis? Has an appropriate level of inflation, consistent with the valuation interest rate, been reflected? A reserve may be set up for future maintenance expense over-run if the assumed expense loadings are not sufficient.
- Has the company ignored any commission savings in respect of orphaned policies?
- Does the valuation interest rate reflect the yields on existing assets supporting the liabilities, likely future yields having regard to the reinvestment strategy of the company and investment expenses? For without-profits business, does it allow for the risk of decline in

interest rate? For with-profits products, are the future bonuses reflected in the reserves consistent with the valuation interest rate?

- Are the policy termination rates assumed reflecting the actual experience of the company? Has the company adopted the direction (i.e. higher termination or lower termination) of the margin for prudence appropriately?

#### 4) Other considerations

- What checks are performed by the company on the accuracy of its actuarial models used to calculate the reserves?
- Does the report of the external peer reviewer under APS-4 provide any additional insight into the valuation?
- Does the asset valuation carried out for solvency purpose conform to the regulatory requirements?
- Review the solvency factors applied to various lines of business and validate the accuracy of the required solvency margin calculations
- Does the company meet the regulatory minimum required solvency margin ratio of 150%?

[10]

### **Shareholder value metrics**

Embedded Value (“EV”) and Value of New Business (“VNB”) will be the key shareholder value metrics to be reviewed during the due diligence.

EV comprises of the value placed on the expected future profits from in force business (“VIF”) and the net worth (“NW”) of the company. Certain key aspects that would be covered in reviewing the reasonableness of the EV are set out below.

#### 1) General

- Understand if the EV / VNB calculation developed internally by the company or certified by an external consultant?
- Understand the checks and reconciliations carried out to ensure completeness and accuracy of the data used by the company. Typically, companies use a single data extract for both statutory valuation of liabilities and management / shareholder reporting purposes. However, if additional or different data extracts are used for EV purposes (e.g. grouped data), additional checks may be warranted.
- Understand whether Company S uses a traditional EV approach or a market consistent approach. Are the results (e.g. VNB margins) comparable against the published benchmarks? Understand the main reasons for the differences.

#### 2) Methodology and assumptions

##### a. Net Worth calculations

- Whether there are any adjustments to the balance sheet net worth, for the purpose of EV calculations?
- Review how the market value upside/downside to the fixed income securities is adjusted in the net worth calculations.

- b. Approach / methodology**
- Whether Company S attributes any value to lapsed unit-linked policies within the revival period? If so, review the approach for appropriateness.
  - Reviewing the treatment of ‘global reserves’ held for the purpose of VIF calculations
  - Whether the ‘orphaned’ policies are material part of the in-force portfolio? If so, whether commission savings on such policies have been appropriately reflected?
  - Whether Company S has been writing any product line on a loss-making basis to build scale e.g. group term business? If so, review how this has been reflected in the EV calculations.
  - Understand the extent to which existing reinsurance arrangements contribute to the EV/VNB and whether reinsurers are contractually entitled to review the existing arrangements should there be an M&A transaction.
- c. Reviewing the appropriateness of ‘best estimate’ basis underlying the EV/VNB calculations:**
- Study the experience analysis results to validate the reasonableness of mortality/morbidity basis
  - Whether the mortality/morbidity experience for the tied agency channels varies materially from the bancassurance channels; if so, whether this has been appropriately reflected?
  - Whether the persistency basis appropriately reflects expected future experience, having regard to the historical experience, particularly so for the unit-linked business given the ‘lock-in’ period and reduced surrender charges for policies sold from Sep 2010 onwards?
  - Whether the persistency experience for different channels is materially different; if so, whether the same has been reflected appropriately?
  - Whether the acquisition / maintenance expense loadings are based on a detailed expense analysis?
  - Whether acquisition / maintenance expense over-runs, if any, are appropriately reflected in the VIF / VNB calculations?
  - If Company S follows a market consistent approach:
    - verify whether the ‘risk free’ yields reflected reconcile to published yield curve and understand the checks carried out, adjustments made, if any
    - review whether the cost of residual non-hedgeable risks has been appropriately reflected
  - If Company S follows a traditional EV approach:
    - review the appropriateness of the investment assumption having regard to the target asset mix, expected yields on various asset classes, investment expenses, default allowance etc.
    - review the appropriateness of setting the risk discount rates
    - Are there any future cash-flow strains (indicating insufficiency of reserves held) in the calculation of VIF? If so, how are they reflected?
- d. Reviewing the approach adopted in allowing for taxation**
- Whether Company S has historical accumulated tax losses? If so, how are these reflected – e.g. ignored or reflected by lowering the tax outgo in the VIF calculations? If reflected by lowering the tax outgo in the VIF calculation, would this be

appropriate – i.e. based on a realistic assessment of its business plan, will Company S be able to utilize the historical tax losses to lower its future profits from in-force business, before the maximum period for which the historical tax losses can be carried forward expires?

- Whether taxes have been appropriately allowed for, particularly whether differential tax rates for ‘life’ and ‘pension’ business have been reflected?
  - Whether Company S has any ongoing litigation with the service tax or income tax authorities? If so, how are these considered in the valuation?
  - Whether Company S passes on the service tax on commissions to the distributors and whether this has been appropriately reflected in the EV/VNB calculations?
- e. Additional considerations for with-profits business**
- Whether the with-profits fund is adequately financed or requires continuing capital injections in the near term?
  - If the fund requires capital injections, whether these have been appropriately reflected in the VIF calculations?
  - Review Company S’s philosophy in relation to the with-profits fund estate; and whether the estate release pattern, if any, reflected in the VIF is appropriate in the light of company’s philosophy?
- f. Others**
- Review the analysis of movement in the EV for the last few years. Particularly, identify if there are significant and continuing experience variances which could indicate that the ‘best estimate’ basis may be more aggressive than warranted.
  - Check the reconciliation of opening reserves underlying VIF projections with the reserves held by the company
  - Review the reconciliation of EV net worth, with the Available Solvency Margin for solvency ratio purposes.
  - Review the sensitivity results to understand the key risks faced by the portfolio, identify any results that are counter-intuitive and understand the same.

**[10]**

**iii)**

It is important to understand the accounting treatment specified in the regulations, particularly for the unit-linked products, to understand why the company has a negative lapse variance in the EV, but a positive contribution to statutory surplus.

For unit-linked products:

- Initial acquisition costs including commissions are expensed out as incurred.
- Unit fund value needs to be fully reserved for.
- The non-unit reserves reflect present value of future non-unit benefits and expenses minus present value of charges. For products written on profitable terms, the non-unit reserves at the outset would be negative. However, regulations do not permit companies to recognize such negative non-unit reserves and require these to be floored to zero at a policy level.

In the revenue account, therefore, there is a significant strain in the year in which a unit-linked policy is written only to be followed by significant profits in the future years as and when charges are received. It is important to note that the revenue account does not fully reflect

expected future profits associated with the in-force portfolio given the regulatory prudence in the reserving bases.

On the other hand, the EV reflects economic cash-flows underlying a policy more closely. The expected future profits would be recognized in the EV as and when the business is written.

In a situation where the actual lapses are higher than expected:

- In a given year, the company may collect surrender charges that are more than expected and allowed for in the reserving calculations – either due to the margins for prudence in the reserving bases or due to zeroisation of the reserves. This may lead to a release of statutory reserves and would result in a statutory surplus.
- However, given the higher than expected lapses, the expected future surpluses included in the EV calculations will come down and this leads to a negative variance in the EV.

Unit-linked business is likely to be the mainstay of in-force portfolio of Company S. Given this, the impact of higher than expected lapses would have resulted in a statutory surplus, but reduction in EV.

For the traditional with-profits business, the EV reflects the present value of future shareholder transfers and is generally positively correlated with persistency. Higher lapses may contribute positively to statutory surplus within the with-profits fund (given the margins for prudence in the reserves), but this may not be directly and fully transferable to the shareholders given the regulatory restrictions on distribution of surplus within the with-profits fund.

For the traditional without-profits business and protection-oriented business, the effect of higher than expected lapses on statutory surplus and movement of EV will depend on the extent of lapse supportiveness of the product and the timing of actual lapse (i.e. at what policy duration). However, typically, given the margins in the statutory reserving bases and the lower surrender value payouts offered, higher than expected lapses would result into a statutory surplus, but a reduction in EV of the company.

Most important takeaway from this is that the lapse rates underlying the EV calculation may have been set on the aggressive side (i.e. lower lapses than actually experienced) and may need reconsideration.

[7]

**iv)**

Section 35 of the Insurance Act, 1938 as amended by Insurance Laws (Amendment) Act, 2015 (“Act”) sets out the relevant statutory requirements applicable to amalgamation and transfer of insurance business:

1. No insurance business of an insurer shall be transferred to or amalgamated with the insurance business of any other insurer except in accordance with a scheme prepared under Section 35 and approved by the IRDAI.
2. Any scheme prepared shall set out the agreement under which the transfer or amalgamation is proposed to be effected, and shall other related provisions.



3. Before a formal application is submitted to the IRDAI, at least a two-month notice of intention to make an application should be provided to the IRDAI along with four certified copies of the following documents:
  - a draft of the agreement or deed under which it is proposed to effect the amalgamation or transfer;
  - balance sheets in respect of the insurance business of each of the insurers concerned in such amalgamation or transfer, prepared in such forms as may be specified by the regulations;
  - actuarial reports and abstracts in respect of the life insurance business of each of the insurers so concerned, prepared in conformity with the regulations specified in this regard;
  - a report on the proposed amalgamation or transfer, prepared by an independent actuary who has never been, professionally connected with any of the parties concerned in the amalgamation or transfer at any time in the five years preceding the date on which he signs his report;
  - any other reports on which the scheme of amalgamation or transfer was founded.
4. The documents listed above should be available for the inspection by the policyholders at the principal and branch offices of the insurers.
5. The balance-sheets, reports and abstracts shall all be prepared as at the date at which the amalgamation or transfer, if approved by the IRDAI, is to take effect. This date shall not be more than twelve months before the date on which the application to the Authority is made under Section 35.

Section 36 of the Act empowers the IRDAI to approve the scheme of amalgamation or transfer. It states that the IRDAI shall cause a notice of the application to be given to policyholders' of the insurers concerned, along with a statement of the nature and terms of the amalgamation/transfer. This may be required to be published in a manner and for a period that IRDAI may prescribe.

After hearing the directors and considering the objections of policyholders and any other persons whom the IRDAI considers entitled to be heard, it may approve the arrangement and make necessary consequential orders to give effect to the arrangement.

[5]

- v) Company B will need to consider the following aspects:
- The transaction should not materially affect the interests of the policyholders of either of the with-profits funds. Particularly, if the transaction results in increased level of financial security (e.g. fund solvency ratio or free asset ratio) of one fund's policyholders at the expense of another fund's policyholders, then this may be difficult to justify.
  - The bonus earning capacity of the two with-profits funds may be different. Company S has been selling its business mainly through the tied agency distribution channel which may have high operating costs. On the other hand, Company B has been focused on bancassurance distribution which may have low levels of operating costs. This relative difference in cost structure may have impacted the bonus earning capacity of the two with-profits funds. Before merging the two funds, a detailed assessment may be necessary of the bonus earning capacity and appropriate communication that may be necessary to the policyholders in respect of future bonuses in the merged entity.

- The financial position of both with-profits funds needs to be evaluated. More specifically, it is important to ascertain adequacy of reserves for both the funds, the level of estate for both funds and the relative scale for both the funds.
- Company S's with-profits fund is likely to be small compared to the Company B's with-profits fund. Given this, the dilution of the level of estate of the with-profits fund of Company S may not be significant.
- The best case scenario is that the reserves for both the funds are adequate and the level of estate (as a proportion of the reserves) is similar for both the funds. In this situation, merging both the funds may not materially affect the interests of the two groups of policyholders.
- Company B has focused on with-profits business for long, whereas Company S has a relatively young with-profits fund. As such, it is likely that the Company B's with-profits fund may have a meaningful estate accumulated whereas this may not be the case with Company S's with-profits fund. In such a situation, if the two funds are merged, the safety net of Company B's policyholders gets diluted in favor of Company S's with-profits policyholders. Company B's Board of Directors and possibly its With-Profits Committee may find it difficult to approve the merger in such a situation.
- Expense levels of the two with-profits funds may be different reflecting the difference in scale of the two funds. It may so happen that while Company S's with-profits fund may have a lower level of estate than Company B's with-profits fund, reflecting post-merger expense synergies may meaningfully contribute to the estate (i.e. these synergies are not used to enhance bonus rates but to achieve a broad equity for the two groups of policyholders). This could potentially justify equitable treatment for the two groups of policyholders and therefore support merging the two funds.
- Investment strategies of the two funds need to be considered. If these are similar, merging the two funds becomes easier. If the two are quite different and have anchored policyholders' expectations (e.g. one fund invests more in equities and has historically declared higher bonuses attributable to superior equity performance), this poses difficulty in merging the two funds.
- The tax position of the two companies and its impact on the respective with-profits funds should also be considered. Is there an advantage in merging the two funds from taxation standpoint?
- The operational issues and costs involved in merging the two with-profits funds may also need to be considered. For example, there may be a difference in the systems used in administering the two funds. Merging the two would involve one-time costs. On the other hand, maintaining the two funds separately would involve ongoing costs. These costs need to be factored in assessing the relative attractiveness of merging the two funds versus maintaining the two funds separately.

Finally, if Company B ascertains that it may not be possible to merge the two funds whilst at the same time retaining the broad equity of the two groups of policyholders; it may be appropriate to keep the two with-profits funds separated after the transaction. Whilst seeking the regulatory approval for the acquisition, such an intention may be disclosed to the regulators.

[10]  
[50 Marks]

**Solution 2:**

i) Risks emanating from unit pricing for the Company would be an example of operational risk, arising primarily due to failed or inadequate processes.

The Company is required to publish its NAVs daily. Consequently it needs to have robust and efficient systems to compute the unit prices at which it is willing to allocate or redeem units every day. Any failures or weaknesses in the process by which it does the calculations of these unit prices can lead to risks for the Company whereby the unit prices may either be over- or under-stated.

If the unit prices are over- or under-stated, it may lead to either a loss for the Company and gain for the policyholders; or a loss for the policyholders and a gain for the Company; or a gain for one set of policyholders at the expense of the other. These situations need to be avoided – as a loss for the Company would clearly be detrimental, whereas a lapse in the processes leading to a loss for the policyholders may invite legal or regulatory actions in addition to imposing a significant reputational risk.

The main risk associated with unit pricing is that different generations of policyholders will not be treated fairly and that their reasonable expectations will not be met.

This may happen due to:

- errors in the calculation of the unit prices at which units are allocated to or de-allocated from the policyholders;
- errors in the calculation of the prices at which units are created or cancelled;
- the way that compensation for errors or inequities of a material size is determined.

The IRDAI regulations require that NAV is computed for each segregated fund separately. The Company offers five unit funds – records of all investments and number of units for each of these funds should be maintained separately, and there should not be any overlap in maintaining such records. Any such overlap or inability to maintain water-tight segregation may lead to mis-statement of NAV for one or the other fund.

Additionally, the computation of unit price should be on a net basis – i.e. with no allowance for any securities dealing costs under ‘appropriation’ or ‘expropriation’ unit pricing approach. Although this may result into the risk of potential inequity between the existing unitholders and new / exiting unitholders, the Company will be required to adopt this approach anyways given the regulatory requirements.

Further risk may be introduced due to treatment of tax in respect of unit linked funds and how allowance is made for tax on realised and unrealised gains/losses. Additionally, service tax is payable on charges deducted from the unit funds. Where the charges are deducted through cancellation of units, any discrepancies in application of the service tax (including the applicable tax rate) may introduce further risk in unit pricing.

The regulations do not allow policyholders to carry out unit transactions using 'backward pricing'. However, if the Company carries out any transaction in the unit funds at a unit price other than the 'current' price, this may pose a significant risk of inequity to different policyholders and / or between policyholders and shareholders. For example, whilst reflecting any correction of a data entry error in respect of wrong fund selection, if the Company does not either add or remove monies from the unit-linked funds to account for the difference in unit price from the time of purchase to the time of putting through such corrections, the action of the Company may result into inequity between different policyholders.

More generally, administration systems may carry out of date or inaccurate information, for example, on asset values or expenses and management charges deducted from the fund.

The IRDA regulations require a reconciliation between the number of units derived from the investment accounting system and those within the policy administration system be undertaken on a daily basis. Additionally, there is a requirement for the NAV calculated in respect of each fund to be audited by the concurrent auditor on a day-to-day basis. Therefore, ideally, significant errors should be picked up in the daily reconciliation checks and audits, but smaller errors may remain undetected for longer.

It can be extremely costly to correct an error in unit pricing which remains undetected for a period of time, both in terms of compensation payments to the affected policyholders and also the costs associated with calculating, applying and communicating correct prices and numbers of units in linked funds.

The management of unit-linked business can also generate liquidity risk, if the underlying assets are relatively illiquid, for example corporate bonds that are not traded or traded infrequently. If there are significant withdrawals from the unit fund and it is necessary to dispose of such assets, this might take some time.

A further risk is introduced in case there are errors or omissions in the unit pricing due to regulatory inspections that may happen from time to time. Not only would there be a possible penalty and cost of rectification of the error, but there may be a significant reputational risk as well due to regulatory penalties / sanctions.

A more general systemic risk in unit pricing exists in case the regulations regarding computation of NAV are changed – particularly with retrospective effect. Costs associated with any unforeseen change could be detrimental to the Company.

There is a further risk of deliberate fraud – whereby unit prices may be manipulated by certain individuals (who may even be internal to the Company) for personal gains. **[10]**

ii) The following risks should be considered in the context of calculating the economic capital requirements:

1. Market risks
  - a. Interest rate risk, including:
    - Parallel yield shifts;
    - Shape changes in yield curve;
    - Interest rate volatility
  - b. Equity risk
  - c. Currency risk
  - d. Property risk
  - e. Credit spread risk
  - f. Market risk concentration risk
  - g. Liquidity risk
2. Life underwriting risk
  - a. Mortality, including:
    - Increase/decrease in mortality rate
    - Catastrophe risk
  - b. Disability-Morbidity
  - c. Longevity
  - d. Expenses, including:
    - Expense inflation;
  - e. Lapse risk, including
    - Increase/decrease of lapse rate
    - Mass lapse risk
3. Counterparty default risk
4. Operational risk, including
  - Reputational risk
  - Contagion risk
  - Risks from external environment (political, legal, regulatory)

[6]

iii) The APS 10 requires allowance to be made for the cost of residual non-hedgeable risk (CRNHR) not already allowed for in the time value of options and guarantees (TVOG) or the present value of future profits (PVFP). It is therefore noted, that when identifying risks as “non-hedgeable” for the purpose of CRNHR calculation, we must consider both - the nature of the risk – i.e. whether non-hedgeable or not, as well as the extent to which it has already been allowed for within TVOG or PVFP calculations.

A non-hedgeable risk is one where deep and liquid capital markets do not exist to hedge such a risk. Capital market instruments to hedge risks may be of the form of various derivatives including futures, options etc.

The non-hedgeable risks may be financial or non-financial. Within the above classification, financial risks are all those listed under “market risks”. Other risks including mortality, longevity, expense, persistency and operational may be deemed as non-financial.

The ‘best estimate’ assumptions for non-hedgeable risks used in the calculation of the TVOG and the PVFP should reflect the mean expectation of outcomes of that risk variable. The total IEV should allow for the mean impact of all non-hedgeable risks on shareholder value. The additional cost of residual non-hedgeable risks should, therefore, take account of any additional cost that arises due to the difference between these two measures. This difference will result because of:

- Asymmetries in the impact of the risks on shareholder value; and
- Risks that are not allowed for in the time value of options and guarantees or the PVFP (e.g. operational risk)

An allowance for uncertainty in the best estimate of shareholder cash-flows due to the non-hedgeable risks is also required to be considered whilst calculating the CRNHR.

We consider each of the risks identified previously, and discuss the extent to which these need to be classified as ‘non-hedgeable’ for determining CRNHR:

#### **Financial risks listed under ‘market risks’:**

##### **1. Interest rate risk:**

- These include parallel shifts and shape changes in the risk free yield curve as well as adverse changes to interest rate volatility than allowed for in the calculation of PVFP or TVOG.
- Typically, in deep and liquid financial markets, interest rate risk may be considered hedgeable, if there exists sufficient instruments to completely hedge against interest rate movements.
- Moreover, the interest risk has partly been allowed for within the ANW (by considering market value of assets, assuming the market captures the macro-level as well as security-specific interest risks to an extent); within the PVFP (by using the ‘risk-free’ rate

- of interest for assumed investment income and discount rates, thus implying that any additional returns on assets held by the Company are off-set by additional risks within those assets); as well as within TVOG (by considering asymmetric impact on shareholder cash-flows of the various stochastic interest rate scenarios).
- However, in India, an argument may be made that the capital market indices are not sufficiently reliable, particularly for longer durations. An emblematic feature of the yield curve in India is that it is relatively flat and an argument may be made that it does not currently allow for reinvestment risks fully. Further, availability of hedging instruments is limited and there are regulatory restrictions on what these can be used for.
  - Depending on the company's asset-liability matching position, it is possible that changes in interest rates pose a significant risk, particularly if the company is invested in short duration assets backing longer duration liabilities.
  - For reasons set out above, it may be reasonable to consider interest rate risk for CRNHR calculations in India, particularly for risks at longer durations.
  - However, the company sells unit-linked and non-participating endowments. In case of unit-linked products, any change in interest rates will impact both the assets and liabilities almost identically. In case of non-participating endowments, the impact of changes in yield curve on shareholder cash-flows would be broadly symmetrical. Consequently, any additional capital requirements to allow for any residual non-hedgeable interest rate risks may be small.
2. Other financial risks (including equity, property, spread):
- Such risks would not be included in the calculation of the CRNHR as in the calculation of the PVFP, no credit is taken for the corresponding asset risk premia.
- Currency risk may not be a concern for the company if it has not sold any business outside of India and is not investing in assets denominated in other currencies.
  - Concentration and liquidity risks may be considered hedgeable, as an alternate investment strategy can be adopted to fully mitigate these risks.

**Other risks:**

Life underwriting risks, such as mortality/morbidity, persistency, and expense are typically considered non-hedgeable unless deep and liquid capital market instruments exist to hedge these risks (e.g. prevalence of mortality/longevity derivatives). However, in India, no such instruments exist and these risks are inherent to life insurance business and should be fully allowed for within CRNHR.

Counterparty default in the case of reinsurer may be considered hedgeable as it is possible to retain the insurance risks fully without getting into reinsurance arrangements.

Operational risks, by definition are non-hedgeable and should be allowed for fully in CRNHR calculations.

[18]

iv) CRNHR may be calculated by following the steps set out below:

1. Identify non-hedgeable risks – as already done above.
2. For each risk, determine the required risk capital. The CRNHR may be calculated by adopting an Economic Capital approach. The risk capital determined should be consistent with a 99.5% confidence level over a one year time horizon, to meet the liabilities under the events represented by the associated risks.
3. Allowance for management actions can be made where appropriate.
4. The 99.5<sup>th</sup> percentile adverse scenario shall need to be calibrated for each risk individually, by considering an appropriate risk distribution and calibrating the required parameters. For key risks, this may be undertaken as follows:
  - a. For financial risks considered under CRNHR, we could look at the historical market data over a long period of time and fit a distribution for the observed historical movements. We can then read-off the 99.5<sup>th</sup> worst outcome based on the historical information. Certain adjustments may be necessary to allow for any outliers or in case the data is considered inadequate in any other way.
  - b. For mortality/morbidity and persistency we should allow for various sub-risks including level, trend, volatility and catastrophe (mass lapse in the case of persistency). Ideally, we should look to calibrate risk distributions based on internal company data by looking at the historical Actual / Expected experience variance, and assess what would be the 99.5<sup>th</sup> percentile adverse scenario for these risks. However, credible company specific data may not exist. Given this, a practical approach to calibration may include adopting the same stress factors as specified in the European Solvency II framework.
  - c. For expense and operational risks, it may be difficult to derive an internal calibration if sufficient data is not available (which is likely to be the case for our company) and we may look to adopt some external calibrations for these as in the case of other non-financial risks.
5. For each of the risk, we would then need to undertake a model run to determine the corresponding risk capital under each stress scenario.
6. The individual risk capitals would need to be aggregated into a single value. To do this, we need to appropriately allow for both diversification benefits as well non-linear / non-separable nature of the impact of the individual risks. Diversification benefits may be allowed for by considering appropriate correlations between individual risks, or by considering more advanced methodologies such as use of copulas. Non-linearity/non-separable nature of the risks may be allowed for by considering combined impact of multiple risk events occurring simultaneously. This would then give us the economic capital for value at risk at the valuation date.
7. Allowance for diversification should consider:
  - a. Diversification benefits within the non-hedgeable risks of the covered business should be allowed for provided the benefit is identifiable and quantifiable
  - b. Diversification benefits between hedgeable and non-hedgeable risks of the covered business should not be allowed for
  - c. Diversification benefits should not be allowed for between covered and non-covered business.
8. The allowance should reflect management's internal view of diversification benefits within portfolios of business and between portfolios and businesses at a group level, if appropriate.



9. However, to determine the CRNHR, we need to estimate the risk capital at each future time-step. It may be impractical to calculate the economic capital at each future time step. As a pragmatic approach, we may run-off the economic capital at the valuation date using appropriate risk drivers over time (such as number of policies, projected reserve, solvency margin, sum at risk etc.), in line with the run-off of the business considered in PVFP.
10. Having projected the risk capital for each future time step, we would then need to consider the appropriate “cost of capital” for the projected capital backing the various non-hedgeable risks. This would be determined as the projected risk capital at each time step, multiplied by a cost of capital charge.
11. The cost of capital charge should ideally represent a required return to the shareholders for the risks undertaken that cannot be hedged. This should be calculated for the company by considering the required cost of equity required by the shareholders and making any adjustments as necessary for the proportion of the required cost of equity that may be suitable for the non-hedgeable risks underlying the business.
12. The projected cost of capital may then be discounted to the valuation date at the risk free rate to determine the overall CRNHR.

The above describes a detailed bottom-up approach. Other approximations are possible for calculating the CRNHR. However, there is a requirement that regardless of the methodology used to determine the allowance for the cost of residual non-hedgeable risks, it should be presented as an equivalent average cost of capital charge. [12]

v)

The Company in ceding part of the cancer cover is exposed to counterparty risk in case the reinsurer fails to honour its obligations in the event of a claim. This may be due to a general failure of the reinsurer or maybe due to refusal of the reinsurer to pay cancer claims due to any other disputes. Such disputes may arise either due to interpretations of definitions of various cancer treatments and coverage, due to disagreements on implementation of various contractual terms – such as underwriting and general risk management by the Company, or any other disputes related to successful recovery of claims by the Company from the reinsurer.

The counterparty risk would impact the profitability of the business and the capital requirements of the Company. The impact would be driven by the amount of cover ceded (and therefore recoverable from the reinsurer); volume of business sold and number of claims received by the Company; Company’s experience in relation to other operating metrics (such as expense, surrender, investment returns etc. – in case other experience of the Company is favourable, it may well be in a position to absorb some of the counterparty risk and the impact is lowered). Additionally, the Company’s on-going relationship with the reinsurer would also be a factor in assessing how severe the impact might be (particularly in case of refusal by the reinsurer to honour the claim rather than as a failure of the reinsurer globally).

It is noted that the Company does not have experience in providing insurance benefits related to incidence of cancer. Therefore, it is possible that it may have relied on the reinsurer rates to determine its own premiums that it charges to the policyholders. This introduces a further risk to the Company as a derivative of placing reliance on its counterparty. Specifically, if the insurer guarantees the premium rates it charges to the policyholder and if the reinsurance risk rates are not guaranteed, there may be a risk that the Company’s profitability may be adversely impacted in a scenario that the reinsurance risk rates are hardened.

The counterparty risk may be allowed for at the time of pricing as follows:

- The cancer incidence assumption used by the Company may be set higher than that implied by the reinsurer's rates to partly off-set the counterparty risk;
- An explicit cash-flow for possible default by reinsurer may be allowed for in the best estimate projections, if pricing using a cash-flow approach. This may take the form of either allowing for lower-than-full recoveries from the reinsurer on claims or modelling probability of reinsurer default explicitly.
- The Company may choose to price the product at a higher risk discount rate to compensate for the additional risks on the product – including counterparty risk.
- The Company may choose to offer benefits / terms that are not inconsistent with the benefits / terms offered by the reinsurer so as to avoid the risk of repudiation of the paid claim by the reinsurer on account of difference in definitions used.

Each of the above methods are likely to result in an implicit charge for the additional counterparty risk taken by the insurer to be levied directly on to the policyholders.

An alternative, and slightly indirect way of allowing for the counterparty risk in pricing may be that the Company may price the product by allowing for higher risk capital requirements, with an explicit risk capital held for the counterparty risk. Subsequently, the cost of holding such additional capital may be loaded within the premiums, rather than direct "costs" projected previously. For example, the Company may decide not to take any credit for the capital support that may be available through the reinsurance arrangement whilst reflecting the 'cost of capital' in pricing.

[4]

[50 Marks]

\*\*\*\*\*