

# **Institute of Actuaries of India**

**Subject SA2 – Life 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) Stochastic testing of solvency position and DST are not necessarily mutually exclusive analysis, though they are typically used in different practical context. Key differences between the two are set out below:

	<b>Stochastic testing of solvency position</b>	<b>Dynamic solvency testing</b>
Sensitivities and scenarios tested	<p>Stochastic testing would typically involve running hundreds (or thousands) of simulations of the risk variable under study.</p> <p>Typically economic variables such as investment returns are subject to stochastic simulation. Although demographic assumptions such as mortality or persistency could also be varied stochastically, in practice this is less common.</p>	<p>DST could be carried out on either deterministic or (nested) stochastic basis – although, in practice, it is more common to undertake projections based on deterministic assumptions.</p> <p>Typically, both sensitivities (involving changes to individual assumptions separately) and scenarios (involving changes to a combination of assumptions) may be tested for both economic and operating assumptions using a limited number of pre-specified sensitivity/scenario tests.</p>
Objective	<p>Stochastic testing would be usually carried out to either assess asymmetric impact on solvency of the key risk variable under study or obtain a full loss distribution to assess various points on the distribution, particularly tail risks such as 99.5<sup>th</sup> percentile, 95<sup>th</sup> percentile, 90<sup>th</sup> conditional tail expectation ('CTE') etc.</p>	<p>DST is generally undertaken to obtain a realistic picture of the current and expected future solvency position under the “best estimate basis” as well as under a range of “what-if” scenarios. This would typically not provide the full statistical distribution of the loss function as in the case of stochastic analysis.</p>
Effective dates	<p>Stochastic analysis would generally be undertaken to assess impact on solvency as at the given valuation date under a range of future (investment) scenarios. Whilst this would provide a full loss distribution as on the valuation date, this would not necessarily provide information on the loss distribution or solvency</p>	<p>DST, by the definition provided, requires assessing solvency position not only at the given valuation date but also at future time periods. This may typically be assessed at annual frequency for a limited number of years (e.g. 3 – 5 years).</p>

	position at future time-steps (which may require undertaking a nested stochastic analysis that may be practically difficult).	
Calibration	Stochastic analysis would require either 'Risk Neutral' or 'Real World' simulations for the risk variables under study. These would typically need to be recalibrated at each valuation date.	The sensitivity and scenario tests to be undertaken would generally be specified as part of the overall objectives of the study and do not need to be recalibrated / amended for each valuation date.

[4]

ii) Reasons for projecting the solvency position for a life insurance company include:

- It allows the company to understand and monitor the evolution of its risk profile. This would help the company to monitor exposure to various risks and potential impact of adverse developments in the near future on its solvency position. It would also provide regulators and any other industry supervisors information with regards to emerging risk exposures of the company (as well as the industry as a whole) so as to establish any early warning indicators and initiate regulatory action, as necessary, in case deterioration in solvency position is expected.
- Solvency projections allow the impact of key business strategy decisions to be assessed, and in particular show the amount of new business strain, and hence the volume of new business, that can be supported by the available capital.
- Solvency projections can be used to estimate the pattern of capital releases (or consumption). This information can then be used to assess whether the company is achieving a suitable return on its capital as well as the expected future capital injections and/or dividend-paying ability of the business. This would also enable optimal capital allocation by providing information on current and expected capital consumption, either across different lines of businesses or towards competing uses of the capital.
- More broadly, solvency projections play a role in risk measurement within the company. It can be used in conjunction with stress testing and reverse stress testing (i.e. starting from a known outcome, such as breaching the threshold of the regulatory capital requirement, and working out what events could lead to that outcome), in order to help companies understand the risks faced and hence enable more effective risk management. This information would also enable rating agencies and other potential stakeholders in judging the financial strength of the company. [4]

iii) Actuarial Practice Standard 3 – Financial Condition Report ('FCR') ("APS 3") advises that an extensive report into the current solvency position of the life office and its possible future development be prepared by the Appointed Actuary of a life insurance company.

Key requirements related to the projection of future solvency position for life insurance companies operating in India as set out in APS 3 include the following:

- Assessment of future solvency position should include the ability of the life office to withstand changes in both the external economic environment as well the particular experience of the individual life office. In particular, the Appointed Actuary should report on any future external factors which present a threat to the life office's financial security and the options open to the life office to deal with those factors.
  - Future solvency position should be assessed for combined effect of a change in two or more related assumptions rather than only testing changes in specific assumptions in isolation.
  - There is no prescribed requirements for the methodology or approach, rather the Appointed Actuary may use whatever techniques he or she considers appropriate to the business written by the life office to assess current and future solvency position.
  - In addition to quantitative assessment, consideration should also be given to what management actions are available under particular circumstances and where appropriate, the Appointed Actuary should make suitable recommendations to arrest any possibility of the solvency position worsening.
  - If the Appointed Actuary identifies situations or sets of situations, which lead or could lead to financial difficulty for which no satisfactory remedial action can be found, the Appointed Actuary should ensure that such matters have special prominence in the report and include any recommendations as to what might be done to avoid such circumstances.
  - Particular attention is required to be paid to factors that might affect the life office such as:
    - Concentration of assets in particular risk areas;
    - Derivatives;
    - Assets containing unusual provisions which may be susceptible to particular risks;
    - Sources of new business which have unusual characteristics;
    - Impending major claims or litigation that might affect the life office;
    - Risks arising out of product literature or policy documentation;
    - Loss of a distribution channel;
    - Impact of options and guarantees in the insurance liabilities in different scenarios.
  - **Documentation:** The analysis of current and possible future development of solvency position should be set out in the FCR (which includes other details, besides solvency position as well). This report should be presented by the Appointed Actuary to the Board of Directors of the Company and should be expressed in a form that is accessible to its readers without concealing important issues because of, for example, undue length or excessive complexity. [6]
- iv)** In the context of current solvency regulations in India, the solvency position of a life insurer is measured as the ratio of available solvency margin (ASM) and required solvency margin (RSM) where:
- Available solvency margin (ASM) is the excess of (admissible) value of assets over the value of life insurance liabilities; and
  - Required solvency margin (RSM) is a factor-based solvency margin calculation, with specified factors applied to reserves and sum at risk, varying by lines of business.

To assess the projected solvency position over the next five years, projected ASM and RSM would be required at the aggregate company level. Hence, the cash-flow projection model office would be required to include cash-flows of both, existing business and expected future new business.

The key aspects that need to be captured by the cash-flow projection model office would be:

- Projection of solvency requirements from existing business
- Allowance for future new business
- Accumulation (or run-off) of excess assets; and
- Other considerations – such as taxation, solvency support available from participating fund, scenario and sensitivity testing etc.

Considering each of these in detail:

#### **Projection of solvency requirements from existing business**

- Key output from existing business would be the expected future solvency requirements from the business already in-force as at the investigation date. This may be done at a policy-by-policy level for all existing business.
- This would require a projection of reserves and whether there is an expectation of a gradual build-up or release of reserve over the next five years (depending on the nature and maturity of underlying contracts). Future RSM for existing business could then be determined by applying relevant factors to the reserves and sum at risk.
- Cash-flow projections would be needed for two sets of assumptions - 'best estimate' and 'reserving'. The best estimate assumptions would be used to determine the expected run-off of the business and expected incomes and outgoes (including investment returns). The reserving assumptions would be used to determine the prudent reserve to be held at each future time period in respect of the (best estimate of) policies that are still on the books then.
- The above interplay of best estimate and reserving basis may need to allow for re-basing for certain products such as unit linked (where unit fund would accumulate based on best estimate fund growth rate), participating business (in case best estimate bonus rates are different to reserving bonus rates) and other similar adjustments in case allowing for future paid-ups / partial withdrawals etc.
- In addition to the projection of reserves and sum at risk needed to assess the RSM, as described above, the expected net cash-flow from best estimate projections would also be required. This would be used to assess contribution to/from the excess assets or ASM based on the profits/losses arising from the existing business.
- The net cash-flow noted above would effectively allow for incomes (including premium income and investment returns on cash-flows as well as reserves) less outgoes (including commission, expenses, death, surrender, maturity or other benefits, net reinsurance outgoes and other benefits). Adjusting for change in reserve would provide the effective contribution to excess assets as noted above (before tax).

#### **Allowance for future new business**

- Projections for future new business cash-flows may be undertaken based on representative model points, suitably scaled up for the expected levels of new business to be written. The model points can be determined either by using actual policy data from previous year's new business and assuming a similar business mix in the future as in the past one year or by developing hypothetical representative

model point policies based on key characteristics (such as age, gender, case size, distribution channel etc.).

- To determine the ASM and RSM, the net cash-flows, reserves and sum at risk projections would be required for new business in a similar manner as that explained for existing business above. Key additional cash-flows that would be required are in respect of inception date / first year items – particularly the acquisition expenses and commissions.
- Additional care may be needed when assessing the assumptions for acquisition expense. In case the assumed expense loadings are set at some long-term levels thereby resulting in potential expense over-runs when compared to the actual expenses, an appropriate adjustment to the net cash-flows should be made to allow for such expense overruns. This is relevant in the context of solvency projections as any expense over-runs would result in a reduction to the ASM and therefore should be explicitly captured. A similar adjustment may be necessary for existing business, particularly in case of any maintenance expense over-runs. Similarly, allowance may be required for any commission under-runs (if not already modelled).
- The new business projection should appropriately reflect any changes expected to the type of business currently being written. For example, any planned new product launches should be allowed. Also, any expected scale- up or scale-down of sales from specific distribution channels may need to be captured as well as allowing for any known new channels that are expected to be added or existing channels that are expected to be closed. Similarly, any changes to sales strategies with respect to target product mix, target case-sizes, target customer profiles etc. should be captured. Ideally, these considerations would already be reflected in the Company's business plan and therefore, it may be important to undertake a reconciliation of projected volumes, product / channel mix etc. against the plan.
- To provide a realistic assessment of the projected solvency position, the best estimate assumption for determining the net cash-flows from future new business may take into account expected operational efficiencies (or potential deterioration). Besides reflecting appropriate level of expenses (which should get captured via appropriately allowing for expense overrun /underruns), this could also include allowance for any persistency improvements or related policyholder behaviour such as propensity to become paid-up / initiate partial withdrawals etc., that the Company expects based on initiatives undertaken. Similarly, in case the target market is expected to be materially different to the existing business, the expected impact of this on the claims experience may also be considered and reflected in the mortality assumptions. Any knock-on impact of such assumptions that reflect the expected future developments on the reserving assumptions may also need to be considered.

#### **Accumulation (or run-off) of excess assets**

Whilst the RSM would be available from the liability projections for existing and new business described above, the excess assets, representing the ASM as on the investigation date would also need to be rolled forward to determine the future solvency position. Key components of this would be:

- **Investment return on the excess assets** as on the investigation date: This would need to take into account the underlying asset mix in which the excess assets are invested and expected best estimate returns on each of the asset classes.
- **Contribution to ASM of existing and future new business cash-flows:** This would be based on the projection of the net cash-flows after adjusting for change in reserves (but before tax) as described above. For existing business, this may typically result in a net positive contribution if the underlying business is profitable, whereas for the future new business there may be an initial strain (due to potentially high acquisition costs and requirement to set up an initial reserve) followed by a gradual release to profits.
- **Capital in- / out-flows:** Any expected capital infusions by shareholders or dividend payouts would affect the ASM and hence, these should be explicitly captured to the extent that they are reasonably predictable based on the current business plans and practices.

#### Other considerations

- **Taxation:** ASM would also get affected by any income tax outgoes based on the Company's profitability. This may be assessed at an aggregate Company level, taking into account profit contributions from both in-force and future new business as well as making any adjustments as permissible by tax laws – such as those in respect of tax losses carried forward, lines of businesses for which profits are tax exempt (e.g. pensions business) or any incomes / adjustments that are tax deductible. Similarly, ASM may need to be adjusted for other government levies or mandatory obligations – such as the Goods and Services Tax (GST) or expenditure under the Corporate Social Responsibility (CSR) initiatives. These adjustments may be undertaken at an overall Company level after consolidating cash-flows for different lines of business for both existing and future new business, or incorporated into the policy-level cash-flow projections, depending on the design of the cash-flow model office used to assess future solvency.
- **Participating fund:** Another important consideration may be the level of solvency support available from the participating fund. If the funds for future appropriations (FFA) in the participating fund is used to support the RSM for the entire Company, this may be included in the ASM. However, in case the internal Company policies prohibit using participating fund FFA to support solvency requirements of other business, then the ASM may need to be adjusted accordingly. Further adjustments may be needed to consider any expected distribution of the FFA over the next five years in the form of increases to reversionary bonus or terminal bonus or one-off bonus, that are not already captured in the assumptions for the underlying policy level cash-flow projections.
- **Reinsurance:** Ideally, reinsurance premiums and recoveries would be projected as part of the policy level cash-flow projections as noted above for existing and new business. However, in the context of solvency projections, it is possible that some aspects of reinsurance are not modelled accurately – either due to model limitations or due to complications such as reinsurance terms being based on a 'lives' basis but cash-flow projections being based on a 'policy' basis. Similarly, net of reinsurance RSM may be required to be assessed at an aggregate level. Required adjustments for the RSM for these may need to be considered at a consolidated Company level.

- **Scenario and sensitivities:** The projected solvency position as described above is based on a number of assumptions – including those in respect of future economic and operating experience of the Company as well as the reflecting the Company’s strategies such as new business volumes, business mix, investment asset allocation etc. To provide meaningful insights, the impact on the projected solvency position under a range of scenarios and sensitivities should be assessed along with the baseline results. [12]
  
- v) The member of the Board of Directors has rightly noted that there are indications that the current factor based solvency regime in India may evolve into a risk based capital regime in the future. However, it at this time, there is no clarity on what the precise requirements and measurement approaches within such a risk-based capital standard for measurement of solvency position would be. Assuming that such a risk based capital standard converges to that of an economic capital approach (similar to the measurement of economic capital as required by the IRDAI in its 2010 circular on Economic Capital), then the key adjustments to the cash-flow model for assessing future solvency position may be as follows:
  - **Adjustments to the measurement of ASM based on market value of assets and market consistent value of policy liabilities**
    - All assets would be valued on a market-value basis as opposed to the current measurement based a combination of market values and amortised book values. Similarly, for both existing assets and future new money investments, whilst carrying out the projection of (excess) assets to determine future asset values, the roll-forward investment returns would need to be based on the expected market returns. This could be different to the current roll-forward for existing assets within the ASM which may use book returns in case assets are expected to be held to maturity and measured on a book value basis.
    - Liabilities would need to be measured on a market consistent basis as opposed to the current prudent basis. For assessing the projected liabilities in the future, several adjustments would be required to the cash-flow model described above which currently projects cash-flows on two sets of assumptions: ‘best estimate’ and prudent (for reserves). Instead, the following adjustments would be needed:
      - For the operating assumptions, there would only be a single set of ‘best estimate’ assumptions which could be used. Thus, there would be no need to project separate sets of probabilities for example, as in the cash-flow model based on realistic and prudent assumptions;
      - Typically, market consistent valuation of liabilities may use a ‘risk-free’ yield curve for projecting and discounting cash-flows. If this is the case, then an assumption would be necessary to determine how the current risk-free yield curve might shift at future valuation dates. A pragmatic approach may be to assume either that the current yield curve “shifts” with the term structure unchanged, or to assume that the forward rates remain unchanged with future yields implied by the current forward rates themselves;



- Any regulatory minimum floors on the liability calculation (such as zeroisation of negative reserves or surrender value floors) in the current model may be required to be removed in the market consistent valuation of liabilities.
  - In case of using a risk-free investment return for measurement of liabilities, the cash-flow model would need to be adjusted to allow for accumulation, at the 'real-world' investment returns, until each future measurement date and computing the market consistent liability at such measurement dates using the assumed risk-free yield curve (from the bullet point above) thereafter.
  - In case the market consistent liability measure requires a "risk margin" or "margin over current estimates" to allow for non-hedgeable risks, a pragmatic approach to projecting this may be necessary – for example, based on appropriate drivers. A theoretically accurate approach may involve multiple nested calculations at each future measurement date, which may lead to unwieldy calculations.
  - Similarly, in case the market consistent liability measure includes a component for time value of embedded options and guarantees, a pragmatic projection basis may be needed to assess the projected future values – for example, based on certain drivers or a closed form solution or a factor-based approach may need to be adopted.
  - As under the current solvency regime, the excess of (projected) assets over liabilities would result in ASM. Both existing and future new business would need to be captured in a similar manner described for the current solvency regime, with the adjustments for measurement of assets and liabilities as noted above.
- **Adjustments to the measurement of RSM, calculated by aggregation of risk capital for various risks determined using stress testing as opposed to a factor-based solvency calculation**
    - Capital requirements within an economic capital approach are based on risk capital quantification for individual risks (e.g. interest rate, equity, mortality, persistency, operational etc.) and subsequently aggregating these, for example, by using a correlation matrix approach. This is significantly more complex than the current factor based approach and therefore projection of future RSM would pose a material modelling challenge.
    - A theoretically accurate approach might require projection of both assets and liabilities (as described above) and subsequently measuring future capital requirements based on (nested) stress tests at each future valuation date and then aggregating using a correlation matrix.
    - However, noting the practical difficulties and challenges of the above approach, a pragmatic approach might be to project the capital requirements based on capital-run off drivers. For example, this may include projected number of policies, life insurance benefit, liability or present value of specific cash-flows as proxy drivers using which the projected risk capital may be measured (e.g. the projected risk capital may be a factor of the projected value of the assumed driver). This may be done at an appropriate level of granularity. - For example, for

the overall capital requirements, this may be done by line of business. ;Alternatively, this may be done for each individual risk and then aggregated.

- An alternative, 'mid-way' compromise between the above two approaches could be to use a capital driver approach for say, market risks and allow for accurate computations for insurance risks. [12]

vi) Distribution of superior equity returns in the form of increase in reversionary bonus rates for the year could have the following impact on projected solvency of the Company:

- Once the increased level of reversionary bonus is declared, the cost of such bonus is included in the liability. To this extent, the ASM would be reduced, resulting in a lower reported solvency position of the Company. Conversely, to the extent that the increased level of assets arising from the superior equity returns remain undistributed within the FFA, these contribute to supporting the solvency position.
- Given the factor-based regime to calculate the RSM, the higher liability due to the higher cost of bonus would potentially result in a higher RSM as well. Therefore, not only would the ASM reduce, but the RSM may increase as well, thereby causing the reported solvency position to further reduce.
- Although the source of surplus is the superior equity performance – and hence likely to be one off, distributing this in the form of reversionary bonus could set an expectation of higher reversionary bonuses in the future, that may be difficult to roll back. In this case, any policyholder reasonable expectations (PRE) formed due to higher bonus declaration in the current year may need to be allowed for within the future projection of liability (and resulting solvency calculation) as well – which may result in an overall higher bonus rate assumption for future projections and consequently higher level of reserves (and lower level of solvency position of the Company).
- The above considerations may apply to future new business as well, depending on how the Company's bonus rates are structured. For example, in case the reversionary bonus scale applies to all policies en-masse, without any segregation into annual (or similar) cohorts, then it is possible that future new business policies may also enjoy the higher bonus rates, resulting in higher projected liability and higher projected RSM requirements arising from such future new business as well.
- If the higher bonus rates result in an expectation of greater new business volumes (due to a perceived superior benefits available with the Company than its competitors), this may also need to be allowed for in the future solvency projections by updating the projected level of future new business.
- Once a reversionary bonus is declared, the associated liability would effectively be guaranteed for the policyholder, thereby introducing constraints on the investments of the Company. For example, depending on the Company's asset-liability matching (ALM) mandates, equity investments may need to be realized and potentially shifted to less risky assets (such as bonds) to match the increased level of guarantees. This may further impact the projected solvency position of the Company due to the revised asset mix (and the corresponding lower level of projected investment returns).

[6]

vii) Possible alternatives to declaring a reversionary bonus could be:

- **Declare a one-off cash bonus:** This would have the benefit of possibly not setting undue expectations and could result in a just distribution of 'excess' one-off surpluses to the current cohort of policyholders. This could also be a popular option for certain types of policyholders that prefer cash-in-hand and may also benefit the Company due to potentially better persistency among this type of policyholders who may have otherwise been inclined to surrender their policy. However, such a combination of 'reversionary bonus' and 'cash-bonus' declarations on a given policy may be challenging to be implemented in the system.
- **Declare a special reversionary bonus:** This could also be one-off, but instead of a cash-outgo, the policyholder has an addition to his or her benefits. However, care would be needed to communicate appropriately that this is a one off special bonus so as not to form PRE that such additional bonus would be payable in the future too. The advantage of this approach over the cash-bonus would be that the underlying assets are retained within the fund for future accumulations as opposed to being paid out immediately. However, the disadvantage is that this would also contribute to an increase in the reserves and solvency requirements.
- **Withhold its immediate distribution, and allocate to a 'smoothing fund' (or the fund for future appropriation, FFA) with a potential ultimate distribution in the form of terminal bonus:** The benefit of this approach would be that it would not constrain the investment freedom of the Company, the assets would be retained as FFA within the participating fund and be available to support the solvency, and there would be no immediate liability or solvency requirements created. However, the disadvantage may be that policyholders would not see any benefit accruing to them immediately.

[6]

[50 Marks]

**Solution 2:**

i) In essence, the structural valuation of future bancassurance business potential through TGT Bank would reflect the discounted value of profits associated with the future new business through this channel, making appropriate allowances towards the risks and costs of capital. In order to ascertain the reasonableness of such structural valuation, the key components to review are set out below.

*1. Sales volumes*

- Review whether all customer segments are covered in the sales projections
- Review the appropriateness of the methodology to project the sales volumes for the deal tenure of 10 years
- Generally, a bottom-up projection would be carried out, taking into account various customer segments and the sub-channels to target each of these segments.
  - For instance, the project sales volumes through the bank branches may be a function of the number of active branches, the number of insurance sales staff at each branch, the activity/productivity of the sales staff and the average ticket size of new policies. Each of these elements would need to be reviewed for reasonableness. Any allowances for future productivity improvements would also need to be reviewed.

- Likewise, credit life sales may be a function of the number of new loans disbursed, expected attachment rate for credit life and the average case size. Each of these elements would need to be reviewed for reasonableness.
- Consider each sub-channel separately and review the underlying capacity, productivity, ticket size assumptions for reasonableness.
- Review the overall sales projections using a top-down approach - e.g. calculate the compounded annual growth rate (CAGR) on new business over the deal tenure. Over the deal tenure, the CAGR should be reasonable in comparison to the expected bancassurance business growth rate at an industry level.
- Consider if TGT Bank would have an exclusive distribution arrangement with ACQ Life or it would be also distributing business for other insurers. If the Bank would be selling other insurers' business, assess if the business projections in respect of ACQ Life is appropriate.
- Specifically, if the TGT Bank would be selling multiple insurers' business and ACQ Life would only be one of these, the reasonableness of the new business volumes projected should be considered in the light of the comparative commission rates / compensation structures that may be offered by ACQ Life vis-à-vis other insurers.
- Consider if TGT Life sold any loss-leading products through TGT Bank to increase their top-line in the past. If so, consider ACQ Life's plans in relation to such products and whether there may be a downside risk to the sales volumes if such products are withdrawn.
- TGT Bank is currently selling products of TGT Life. As it transitions from selling products from one insurer to another, there may be some initial disruption at the time of transition (e.g. it may take time for all sales staff to be trained on ACQ Life's products). Review that the sales growth rates in the initial year or two are not overly aggressive.
- Consider the sales model adopted by TGT Bank currently as compared to what ACQ Life may wish to adopt. If the TGT Bank currently adopts a model of 'assisted sales', seeking support from the life insurance sales representatives of TGT Life in carrying out a sale and if ACQ Life wishes to implement a model that is more 'internalised' within the TGT Bank, any delays in implementing such a model and its implications on the sales volumes in the short term should be considered.

## 2. *Product profitability*

- Review the product mix for reasonableness:
  - The projected product mix for each sub-channel should broadly reflect, at least in the initial years, the current product mix for such sub-channels.
  - The product mix should be compared with the industry level Bancassurance product mix for reasonableness.
  - If ACQ Life's product strategy is materially different to that of TGT Life, then this should be appropriately allowed for over time.
- For each product, the profitability should be assessed based on product-level cash flows using appropriate demographic and economic assumptions.
- Review such demographic and economic assumptions for reasonableness. In particular:
  - Review how the persistency basis reflected in the product-level cash flows compares to the actual experience of the business written through TGT Bank.
  - Review how the mortality/morbidity basis reflected in the product-level cash flows compares to the actual experience of the business written through TGT Bank.

- Consider the commission rates reflected in the product-level cash flows and review whether they are competitive in view of the market commission rates for Bancassurance channel in general.
- Also, for completeness, it should be checked that the commission rates are within the statutory maximum limits.
- Review the overall product portfolio profitability (e.g. portfolio level value of new business or 'VNB' margin) for appropriateness at a top-down level. If the overall VNB margin is on a higher side (e.g. a legacy non-participating savings product which was priced when interest rates were low may be highly profitable in higher interest rate environment), then a top-down 'margin squeeze' may have to be applied to reflect future management actions (e.g. re-pricing of products).
- Consider having product level cash flow models peer reviewed to gain greater comfort around modelling accuracy.

### 3. Expenses

- Review the projected distribution expenses (e.g. channel set-up costs, costs of recruiting and training sales staff, marketing costs etc.) and ascertain how these compare to the unit costs reflected in the product-level cash flows.
- It is possible that the initial distribution expenses are higher than the unit costs allowed for in the product level cash-flows. Review whether such expense over-run is appropriately reflected in the structural value calculation.
- Review the projected increase in direct and overhead expenses associated with partnering with TGT Bank (e.g. increase in underwriting or operations staff headcounts). Ascertain whether such increase is justifiable taking into account sales projections.
- Review whether the maintenance expense allowances in the unit costs underlying the product level-cash flows can support such incremental expenses.

Finally, the structural value for the future bancassurance business would be the discounted value of future VNBs adjusted for any expense over-runs. In such discounting of future VNBs, consider whether the discount rate considered appropriately allows for the risks associated with the ability of the TGT Bank to deliver the sales volumes projected at the assumed level of profitability. Specifically, given that the embedded value of TGT Life has been performed on the market consistent 'Indian Embedded Value' (IEV) basis, if the future VNBs are also developed on IEV basis, it may not be appropriate to discount these at the risk free rate in the structural valuation.

It may be appropriate to review whether this calculation has been performed accurately.

It may be also appropriate to compare the overall ratio of the structural value to the embedded value against any other deals in the market for similar sized insurers with access to similar type of bank distributors, to ascertain the reasonableness of the overall approach and the results.

[16]

- ii) Reinsurers provide quotations to insurers based on various factors, including the insurer-specific underwriting / claims management philosophy, the quality of the insurer's underwriting / claims management teams, robustness of the reinsurance administration systems adopted etc.

In order to accelerate policy issuance / claims processing, the reinsurers also typically grant binding authority to the underwriting and the claims management teams of a life insurer, up to certain limits. The underwriting / claims decisions taken by the life insurer are, thus, contractually binding to the reinsurer.

Upon a change in the shareholding of a life insurer which may result in a change in the management itself, it is possible that there will be a consequent change in the underwriting / claims management philosophy and practices. If such a change is material, then this may jeopardize the pricing basis of the reinsurer's original quotations, based on which it would have agreed the reinsurance terms with the insurer.

As such, it may be reasonable that a reinsurer reserves the right to terminate the treaties upon a change in the shareholding structure of a life insurer.

[3]

- iii) Firstly, prepare a list of all reinsurance treaties that TGT Life has entered into. For each treaty, summarize the amount of business reinsured, reinsurance claims recoveries and reinsurance premiums paid over the last few years. The treaties where the reinsurance claim recoveries are consistently and significantly higher than the reinsurance premiums paid are more likely candidates for termination by the reinsurers.

It would be useful to evaluate the impact of a treaty termination in the calculation of Indian Embedded Value for TGT Life. For products that are reinsured under the treaties likely to be terminated, it would be useful to compute their value of in-force (VIF) with and without reinsurance. This will give a sense as to the financial impact of any treaty termination. If such an impact is material, ACQ Life should consider applying a haircut to the valuation to reflect the risk of treaty termination.

In addition, if TGT Life has multiple treaties with a reinsurer of which some are profitable to the reinsurer whilst others are not, then this may give ACQ Life some leverage to negotiate with the reinsurer to retain all the treaties (if they are profitable to the reinsurer on aggregate). Also, ACQ Life's own business relationships with the reinsurer may provide additional leverage in discussions with the reinsurer and retaining the current treaties of TGT Life. If ACQ Life feels that it may be able to reach an agreement with the reinsurers and continue the existing treaties of TGT Life, a lower valuation haircut may be applied.

If possible, TGT Life may be requested to obtain written confirmations from the reinsurers on the treatment of the reinsurance treaties following completion of the transaction. Although the reinsurers

may not provide any legally binding confirmations, the intentions may be clearer based on such responses, which can be suitably used to reflect appropriate adjustments to the IEV of TGT Life.

[4]

iv) A good starting point of such a review would be to understand the liability profile.

The liabilities for the single premium group credit life business would reflect the following cash flows:

- death benefits
- surrender benefits, if the product offers any refund of unearned premium upon surrender of the insurance cover by any member of the group policy
- maintenance expenses
- reinsurance premiums and claims recoveries, if the business is reinsured

The death benefit is contractually guaranteed and does not have any discretionary element. Substantial proportion of the surrender benefit is also likely to be contractually guaranteed. Although there may be some non-guaranteed 'special surrender value', in practice, the insurer may be unlikely to vary the same other than in exceptional circumstances. Thus, in both death and surrender benefits, the benefit patterns are determined at the outset and are fixed in nominal terms.

The reinsurance cash-flows may also depend on the retention levels of TGT Life and the level of sums insured in the group credit life policy under the various types of loans issued. However, like the death benefit, the reinsurance terms are contractual and therefore the benefit patterns would be known at outset.

Projected maintenance expenses may have an element of inflation embedded within.

Given that these products would all be denominated in Indian rupees, the liabilities would not have any linkage to other currencies.

In addition, it would be appropriate to consider the liability cash flow projections as well as the modified duration of the liabilities. Given that this product is a single premium product, the modified duration of the portfolio should be meaningful unlike that in a regular premium product in the initial years.

The liability duration for the credit life business would vary depending on the duration of the underlying loans. For instance, credit life associated with mortgage loans will have a longer duration whereas credit life associated with personal or automobile loans will typically have a much shorter duration. The calculated modified duration can thus be assessed for reasonableness based on the business mix of the underlying loans.

The asset portfolio should be reviewed in view of the liability profile. Key considerations for such a review are set out below:

- Investment team has explicitly earmarked the assets backing these liabilities. To begin with, ascertain that the value of such assets is not less than the liabilities.
- The liabilities are guaranteed and largely fixed in nominal terms, with the exception of expenses, which would depend on the future inflation rates. As such, it would be appropriate to invest mainly in fixed income assets. Normally, one would not expect a sizeable allocation into equities or real estate in the assets backing such liabilities.
- Review the investments earmarked by TGT Life for their compliance against its internal investment policy.
- Review the proportion of the fixed income assets that are allocated to government bonds vis-à-vis corporate bonds. Some allocation into corporate bonds for yield enhancement purposes may be reasonable or even desirable.
- If significant corporate bond investments are made, then it may be appropriate to review whether the insurer has large exposure to any one entity to ensure sufficient diversification within the corporate bonds portfolio.
- It may be appropriate to consider the proportion of the corporate bonds into various credit rating buckets. Too high exposure to bonds with lower credit rating may need to be identified.
- Review the asset cash flows in conjunction with the liability cash flows. Closely matching cash flows are good to have but there may be practical constraints to achieving this.
- Review the liquidity of the assets, in particular whether the liability cash flows pertaining to any surrenders in the short term can be covered adequately.
- Review the modified duration of the assets and compare this with the modified duration of the liabilities. The insurer may have a mismatch tolerance – this should be reviewed for reasonableness. Typically, a duration mismatch of up to  $\pm 2$  years may be acceptable.

[10]

v) The key risks associated with such a product are set out below:

#### Morbidity risks

The product is a 15-year limited pay product that provides critical illness coverage until age 80. The morbidity risk can manifest in various forms as discussed below.

There is a risk that TGT Life underestimated the critical illness incidence rates in pricing the product. Generally, an insurer would set the critical illness incidence rates taking into account its own experience, any published industry statistics, reinsurance quotations etc. If TGT Life relied largely on its own internal experience to guide the rate-setting and such experience was not sufficiently credible, there is a risk that the premium charged may turn out to be insufficient.

Another related element of the rate setting is making allowance for medical trends in critical illness diagnostics in the future. Generally, with the advancement in technology, the diagnosis rates of critical



illness (e.g. cancer), tend to increase. In a product that provides coverage until age 80, it would be appropriate to make some allowance for such trends in setting the best estimate incidence rates. In the absence of such an allowance, there is a risk that the actual experience may be adverse relative to the best estimate pricing basis.

The product offers long-term coverage until age 80 but the premium payment term is limited to 15 years. Implicitly, TGT Life ends up providing long-term morbidity guarantees. If the product had offered regular premium payment (instead of limited premium payment), then TGT Life would have been able to increase the premiums (subject to meeting its policyholders reasonable expectations, or 'PRE') for in-force policyholders if the critical illness experience was significantly adverse relative to what was priced for. However, such premium adjustability is significantly constrained in a limited pay product as the premiums can only be increased during the first 15 policy years; and a significant increase in premium rates charged early on in the policy term may be difficult to justify on PRE grounds. Such long-term morbidity guarantees expose TGT Life to a significant risk of adverse experience over time.

It is possible that TGT Life may have reinsured this portfolio. However, if the reinsurance premium rates are 'non-guaranteed' in nature and / or applicable throughout the policy duration, if the actual morbidity experience is worse than that reflected in pricing, it would expose TGT Life to a further loss arising if the reinsurance premium rates also harden as a result of the worsened morbidity experience.

#### Investment risks

The product is a non-participating, limited premium payment product. Significant reserves will be built up during the premium payment period and such reserves, along with the investment income thereon, will be gradually released to pay for future claims and expenses.

Due to the non-participating nature of the product, the investment risk on backing assets remains with the insurer. If the interest rates reduce in the future, then the reserves and investment income thereon may not be adequate to cover the future claims and expenses.

In addition, the product provides coverage until age 80 and therefore the liabilities may be quite long-tailed in nature. If appropriately long duration backing assets are not available, then this may lead to a significant strengthening of reserves when interest rates reduce in the future.

#### Lapse risks

Higher than expected initial lapses may adversely affect the product profitability.

Also, in a level premium product, lower than expected lapses in later years may adversely affect the product profitability. However, this may not be as much of an issue for younger issue ages, given that the premium payment term is limited to 15 years, although the coverage is upto 80 years.

In addition, there may be some form of anti-selective lapses at later durations that may lead to adverse overall morbidity experience.

In the context of the M&A transaction, ACQ Life may be more concerned about later duration lapse risk and anti-selective risk as opposed to the initial lapse risk.

Given the limited premium payment and long duration coverage, we need to also consider if the product offers any surrender values before / after the premium payment term. If offered, the impact of lapses / surrenders on the overall profitability of the product would depend on the exact level of surrender values offered at different durations.

#### Expense risks

This corresponds to the risk of underestimating the ongoing maintenance expenses. In the context of the M&A transaction, ACQ Life will need to review whether the ongoing maintenance expenses are adequate when compared with the unit costs.

Claims management expenses may also be relevant. If the pricing of the product does not allow for appropriate level of future claims investigation expenses (taking into account the long term nature of the contract), there is a risk that the profitability of this product may be adversely impacted.

#### Other risks

Other relevant risks associated with such a product are set out below:

- There is a risk that the contract wordings around definitions of / exclusions related to critical illness are not appropriately drafted, or were not appropriately explained to the policyholder at the point of sale. If the definitions are not watertight, this may lead to either higher than expected claims costs, expenses or a damage to the reputation of TGT Life (if many claims are declined in the future).
- If the product is reinsured, then the insurer is also exposed to the counterparty risk of the reinsurer failing to honor its contractual commitment in the future.

[13]

vi) Following the recent changes in the tax rules, the long-term capital gains taxes on mutual funds is set out below:

- For equity-oriented mutual funds, a tax of 10% is applicable on long-term capital gains exceeding Rs. 100,000 in a fiscal year.
- For debt-oriented mutual funds, taxes are levied at 10% of long-term capital gains without allowing for indexation or at 20% of long-term capital gains after allowing for indexation, whichever is lower.
- For equity-oriented mutual funds, the long-term capital gains tax change has been applied prospectively i.e. any capital gains accrued as at 31 January 2018 shall be tax-exempt in the future.

In comparison, for unit-linked insurance business, the maturity proceeds are tax-exempt under Section 10 (10D) of the Income Tax Act, 1961 provided the product offers a certain minimum level of death benefit. This tax benefit is not available to all mutual fund schemes, but only a sub-set of equity oriented mutual fund schemes (Equity Linked Savings Schemes).

Unit-linked insurance products typically offer a flexibility to switch funds without attracting tax incidence at the point of switching. In comparison, any such switches within different mutual fund schemes of the same provider would attract tax incidence.

Overall, the recent changes in the tax laws have made unit-linked insurance products more tax-efficient for the customers relative to the mutual funds.

[4]

[50 Marks]

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