Institute of Actuaries of India

Subject SA2 – Life Insurance

September 2017 Examination

INDICATIVE SOLUTION

Introduction

The indicative solution has been written by the Examiners with the aim of helping candidates. The solutions given are only indicative. It is realized that there could be other points as valid answers and examiner have given credit for any alternative approach or interpretation which they consider to be reasonable.

Solution 1:

i)

The yearly renewable group term assurance business has not been profitable for the Company even though the target profit margin for this business is 10%. It would be appropriate to perform an analysis of surplus to identify the drivers for the adverse profitability. For this business line, mortality and expense surpluses would be relatively more relevant as compared to lapse and investment surpluses.

Mortality/Morbidity Surplus

Following aspects should be taken into consideration whilst analysing the mortality/morbidity surplus:

- Review if there are any trends in mortality/morbidity surplus over time.
- Review the mortality/morbidity surplus by grouping various schemes by industry groups. Identify if there is any particular industry where the experience has been poor.
- Review the mortality/morbidity surplus by grouping various schemes by scheme sizes. Often, due to the highly competitive nature of the yearly renewable group term business, companies provide aggressive quotes for larger schemes.
- Review the underwriting practices of the Company. In particular, has the Company been very liberal with the underwriting practices e.g. waiver of 'actively at work' clause, liberal occupational classification etc.?
- Review if there are any anti-selective product features which are being abused e.g. an option to the employee to voluntarily increase the coverage by paying additional premiums
- Review whether the Company writes any business on experience refund terms with the clients, in particular whether this is offered only for large clients with adequate pooling of risks or not.
- It may be possible that whilst the Company makes adequate profits on the base plan (i.e. death benefit) but makes losses on attached riders such as critical illness or accidental benefits. Investigate to check whether this is the case.

Expense Surplus

Following aspects should be taken into consideration whilst analysing the expense surplus:

- Consider the direct expenses such as those for group sales or group operations teams. Are these teams serving any other lines within the group business e.g. group fund business? If so, review how their salaries are allocated within various lines of the group business.
- Review the appropriateness of the indirect expenses allocated to this line of business. In particular, review whether the expense allocation is consistent with the expense loadings in the quotations.
- The Company's premium income for this business has remained relatively flat over the last five years. Review the trend of expenses in view of this and whether there are any opportunities for efficiencies.
- Typically, the stamp duty is paid only for new schemes and not for schemes that renew. For renewing schemes, only incremental stamp duty is required to be paid on the sum assured in excess of the prior year's sum assured. Does the Company amortise such stamp duty in its quotations e.g. charge 1/3rd of the stamp duty in the premium rate? If the renewal rate is lower, then the Company may be paying higher stamp duty than what is priced for.
- Did the Company incur any one-off expenditure during the recent past? For instance, any new IT investments would typically be amortised over 3-5 years even though the benefits may persist longer.
- How is the group business sourced? Are any third party distributors involved in the sale? If so, does the Company pay any compensation to them, which is not reflected in the pricing of the product?

Other considerations

Certain other considerations that may be investigated are set out below:

- Review the Company's quotation process, in particular whether the Company has a practice of issuing special quotes by reducing expense or profit loadings in order to win large cases. Review whether appropriate governance exists around such practice to make sure it is not being abused.
- Review the reinsurance arrangements for this line of business. In particular, review if the Company has been ceding a substantial portion of the mortality/morbidity profits whilst bearing expense risks fully by itself.
- Review whether there have been any catastrophic losses that have affected the profitability adversely. Consider whether it is appropriate to enter into a Catastrophe Reinsurance arrangement to mitigate against this.
- Review whether there is an opportunity to optimise the assets-liabilities management (ALM) strategy for this business. In particular, if the assets are being invested in short term bonds given the short term liabilities, there is an argument to go longer on a going concern basis since the liabilities have rolled over steadily in the past.
- Review the reserving basis adopted. Given the yearly renewable nature of the business, typically, the Company may be holding reserves on an unearned premium reserving (UPR) basis subject to a floor of reserves on a gross premium valuation (GPV) basis. However, review if any excessive prudence is being built into the GPV calculations.

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ii)

Various considerations that need to be taken into account while evaluating the proposal to invest up to 15% of the backing assets into real estate are set out below.

a. Yields

The negative spread experienced over the past five years has been around 30bps to 50bps.

An assessment needs to be made as to the additional yield pick-up that may be obtained from the real estate investment vis-à-vis bonds. If the real estate can provide a 3%-4% yield pick-up (net of expenses and taxes) relative to bonds, then this can help achieve a 50 to 60 bps of yield pick-up for the group fund based products. This should be approximately sufficient for the Company to achieve a positive investment spread or at least break-even.

In addition, the Company needs to consider the split of the expected return into rental yield and capital appreciation components. Generally, the former is more stable year on year whereas the latter is more uncertain. Therefore, an investment where rental yield is a higher proportion of the total yield may be more desirable.

However, the accounting requirements in India require that any unrealised gains on property revaluation should be recognised as equity in the balance sheet. Only the realised gains are allowed to be recognised as profits in a year. Given the non-participating nature of the contracts, the Company may not wish to use the additional yield gained through unrealised gains to support the crediting rate. Also, realising the gains on a regular basis may also not be practical. The Company may need to consider this aspect of property investment whilst considering the proposal.

b. Scale

The Company needs to assess whether the scale of the non-participating fund where the backing assets will be held is adequate.

Properties are lumpy investments. Generally, the ticket size for property investments is significantly higher than that of fixed income instruments. If the non-participating fund in respect of the group business is small, then it may not be practically feasible to allocate assets to property.

c. Expenses

Although the gross yield pick-up with properties may look attractive, the Company needs to take into consideration the fact that the management expenses with properties tend to be on a higher side compared to other assets.

Property management expenses would include expenses associated with searching the properties, performing the due diligence, legal documentation, ongoing maintenance etc. The Company may want to have an internal team to look after this or hire an external expert. Either way, the additional costs will need to be taken into consideration while evaluating the yield pick-up.

d. Asset Liability Management

The Company needs to take into account the liability characteristics especially from the liquidity point of view.

Typically, the group funds business is written on a yearly renewable basis. Clients have an option to access their assets any time, generally with minimal surrender penalties. If the fund size fluctuates from one year to the next, and if the clients are actively managing their portfolios based on the returns declared by various insurers, the Company may incur impact costs if it needs to liquidate property investments in a short time to support surrender benefits. In addition, the ability of the Company to pass on market value reductions, if any, to the clients may be limited.

e. Taxes and Duties

There may be additional tax considerations associated with real estate investments. For instance, stamp duties payable upon the purchase of a property may be significantly higher compared to other investments. In addition, local municipal body taxes may be payable on an ongoing basis. Also, any implications due to the Goods and Services Tax (GST) on rental income may also need to be considered.

The Company needs to accurately ascertain the tax implications as these may substantially dilute the benefit of any yield pick-up.

f. Alternatives

The Company needs to assess alternative strategies to provide a comparison reference for real estate investments:

- Are there any opportunities for yield pick-up by taking on more credit risk through investing in corporate bonds?
- Are there any opportunities for yield pick-up by lengthening the duration of the fixed income portfolio?

- Are there any real estate trusts or funds that the Company can subscribe to thereby participating in the real estate asset class?

g. Impact on the financial metrics

The Company needs to assess the impact of the investment strategy on its key financial metrics such as statutory surplus, embedded value (EV), value of new business (VNB), solvency etc. In particular, if the Company is reporting its EV/VNB on Indian Embedded Value (IEV) or an equivalent market consistent basis, then it may not be able to reflect the yield pick-up in the EV/VNB computations. This may dilute the attractiveness of the property investments.

h. Regulatory considerations

As per the extant regulations, the investment property may not exceed, at the time of investment, 5% of the investment assets of the Company's life fund. In addition, any such investment property cannot be for the self-use of the Company. Self-use properties have to be purchased out of the shareholders' funds only.

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iii)

The Company has been selling term assurance products through the Digital channel since 2011. Term assurance products in India are of level premium in nature i.e. a policyholder's premium is determined at the policy inception and stays constant throughout the policy term. By design, such level premium term assurance products may be lapse-supported in nature, i.e. depending on the duration at which the policyholder lapses his policy, higher level of lapses may result into higher profitability for the Company.

In addition, the pure term assurance products in India typically do not offer any surrender benefits. This also increases the level of lapse support built into the product.

The underlying mortality rates in a term assurance product would increase with age. There may be an exception in the form of an accident hump at younger ages but generally the effect of this is small. Since the premiums charged to the policyholders are level and not yearly renewable, the underlying mortality rates would be 'levelised' using an appropriate lapse and interest rate basis during pricing.

In the early years, the lapse support may not yet come into play. Partly, this is attributable to the high acquisition costs in the first year including stamp duty costs. If the lapses were to be higher than the best estimate basis at these early policy durations, then the Company will stand to miss some of the profits embedded in the future premiums.

However, after a few years, the lapse support will begin to play out. If the ultimate lapse rates are in line with the best estimate basis, then the Company will be able to release the reserves for policies that lapsed since there is no surrender value paid to the policyholders.

On the other hand, if the ultimate lapse rates are lower than the best estimate basis, then the expected release of reserves will not materialize fully. In such a situation, whilst carrying out AoM of IEV, the persistency variance on the Adjusted Net Worth (ANW) component of the IEV will be negative. Even though the persistency variance on the Value of In-Force (VIF) component of the IEV may be positive as more policies are in force generating future profits, it may be inadequate to offset the negative impact on ANW. This will result in the overall persistency variance on the IEV to be negative.

The Company has been selling term assurance products through the digital channel since 2011. It is possible that the lapse rates in the initial years are broadly similar to the best estimate basis but that the ultimate lapse rates are lower than the best estimate basis. In this scenario, the positive persistency variance associated with the initial lapse rates may be quite small whereas the negative persistency variance associated with the ultimate lapse rates may be large, thereby resulting into an overall negative persistency variance.

It will be useful to take into consideration the Company's reinsurance arrangements for this product. If the reinsurance premium rates are 'level premium' then this may reduce the degree of lapse support in the product. However, if the reinsurance premiums are yearly renewable (i.e. on an attained age basis) as is commonly the case, then the lapse support will not be diluted through the reinsurance arrangement.

Given that the business has been sold through the Digital channel, it may have been offered on very competitive terms, with thin shareholder margins. Any differences in the actual level of persistency vis-à-vis the best estimate assumptions may, therefore, have a large impact on the profitability, which will be visible through the AoM on IEV.

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iv)

IRDAI (Assets, Liabilities and Solvency Margin of Life Insurance Business) Regulations, 2016 require the valuation of liabilities to reflect the actual experience of the insurer in relation to the policy maintenance expenses. In addition, it states that the policy maintenance expenses shall be increased in the future to allow for inflation. The rate of inflation is required to be consistent with the valuation interest rate.

It may be possible that the valuation of liabilities reflects long-term, 'steady state' expenses as opposed to the most recent expense experience. Such a situation arises especially for new start-up insurers in their early years but may also apply for insurers who have been operating for long without achieving scale. In such cases, an appropriate level of additional provision is required to be made. For instance, an additional provision towards future maintenance expense gaps may be made.

The requirement to reflect such an additional provision in the valuation is not applicable to the life insurance companies for the first five years from the commencement of business.

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v)

Various items for which aggregate provisions are required to be made are set out as follows:

- policies in respect of which extra premiums have been charged on account of underwriting
- lapsed policies not included in the valuation but under which a liability exists or may arise
- options available to the policyholders
- guarantees available to the policyholders
- foreign exchange fluctuations in respect of policies issued in foreign currencies, if any
- others, if any. Although not specified explicitly in the regulations, such 'other' items may include:
  - reserves for incurred but not reported (IBNR) claims
  - reserves for additional expenses in a scenario that the insurer is closed to new business.

[3]

[50 Marks]

Solution 2:

The checks and validations on the output from the product pricing would ideally be undertaken so as to ensure that:

1. Product features / benefits meet the relevant regulatory requirements;
2. The underlying methodology used is appropriate;
3. The underlying assumptions are reasonable and appropriate;
4. The cash-flow outputs are accurate, capture all relevant product features and are consistent with the methodology and assumptions made; and
5. The overall conclusions / outcomes of the pricing exercise, including the premium rates, profit testing results and other relevant outputs are reasonable.

We can assess the above at a granular level for each of the cash-flow outputs as follows:

Check the set-up and model point selection:

i. Output is provided for up to 10 years only. Check that this is consistent with maximum policy term as per product features.

ii. Obtain descriptive information for the sample model point selected (age, gender, policy and premium term etc.) and validate whether this is reasonably "representative" for the purpose the output is being used. Consider whether a different model point is required and/or multiple model point outputs need to be checked.

Detailed checks on cash-flow output provided:

i. In-force probability

- Validate reasonableness: The in-force probability commences with 1 at t=0, which is appropriate for new business projections.
- Test accuracy: Ensure that (in-force probability at end of period) = (in-force probability at start of period) – (number of deaths) – (number of surrenders); and equally, (in-force probability at end of period) = (in-force probability at start of period) * (1 – independent probability of deaths) * (1 – independent probability of surrenders).
- Validate reasonableness: Check how the projected in-force probabilities compare against reported persistency ratios for the relevant line of business (e.g. 13th month persistency compared with in-force probability at t=1 etc.) and whether any differences are justifiable (e.g. if there are reasons to believe that expected future experience for the current product will be different to the ongoing reported ratios).

ii. Independent probability of death and number of deaths

- Validate assumption: Check how the projected numbers compare with mortality rates (qx's) set out in the assumed mortality table (IALM 2006-08) and whether the ratios are consistent with the intended mortality assumption for the product for the given average age of the model point.
- Validate reasonableness of the assumption:
  a. Check whether the percentage of mortality assumption is reasonable and consistent with recent and expected future experience of the Company for similar products / line of business / corporate agency distribution channel and target customer segment.
  b. If it is possible to obtain, gather "market intelligence" or benchmarking data for experience with respect to similar products offered to similar target customer segments by competitors

c. and/or assumption used by peer group companies to assess reasonableness of internal estimates against market data.

- Test accuracy: Number of deaths should be consistent with the modelling assumption with respect to timing of deaths and surrenders. If deaths are assumed uniformly during the year and surrenders at the end of the year, then (number of deaths) = (probability in-force at start of period) * (independent probability of deaths).

iii. Independent probability of surrender and number of surrenders

- Validate assumption: Check whether the assumed %s for independent probability of surrender is consistent with the intended surrender assumption for the product for the given model point.
- Validate reasonableness of the assumption:
  a. Check whether the surrender rates are reasonable and consistent with recent and expected future experience of the Company for similar products / line of business / corporate agency distribution channel and target customer segment.
  b. If it is possible to obtain, gather "market intelligence" or benchmarking data for experience with respect to similar products offered to similar target customer segments by competitors and/or assumption used by peer group companies to assess reasonableness of internal estimates against market data.
- Test accuracy: Number of surrenders should be consistent with the modelling assumption with respect to timing of deaths and surrenders. If deaths are assumed uniformly during the year and surrenders at the end of the year, then (number of surrenders) = (probability in-force at start of period) * (1 - independent probability of deaths) * (independent probability of surrender).

iv. Amounts: premium

- Validate that the premium amount of 20,000 p.a. is consistent with the intended premium for the representative model point. Assess reasonableness based on expected average case size for similar products sold to the target customer segment.
- Check consistency against product features: Premiums appear in the cash-flow projections for up to 8 years for a 10 year policy term. It should be checked whether such limited pay option (i.e. premium term of 8 years and policy term of 10 years) is consistent with the intended features.

v. Amounts: death benefit

- Check consistency against product features: Death benefit appears to be 200,000 for a premium of 20,000 p.a., i.e. 10x the premium amount. It should be checked whether this is consistent with the intended product features (particularly given that premiums are payable for 8 years only).
- Check compliance with the applicable regulations for minimum death benefit: i.e. the death benefit should be at least equal to the highest of 10x annualised premium, or 105% of premiums paid or minimum guaranteed sum assured on maturity or the sum assured payable on death. It appears these conditions are being met for the model point provided if the sum assured is 200,000 for the annualised premium of 20,000, payable for 8 years.

vi. Amounts: survival benefit

- Check timing and amounts for consistency against product features: The modelled amounts of 25,000 payable in year 9 and 200,000 payable at the end of policy term (year 10) should be validated against product features – whether these are indeed the applicable pay-outs intended.

vii. Amounts: surrender benefit

- Check timing and amounts for consistency against product features: Should carefully study the definition of surrender benefits under the product and ensure that the projected amounts are consistent with the intended definition – particularly with respect to timing of applicability of relevant factors for guaranteed surrender value (GSV) / special surrender value (SSV) if surrender value is defined based on these.
- Sense check on reasonableness: The surrender values appear to be less than the premiums payable to date throughout the projection and seem to gradually increase to be equal to the guaranteed survival benefit payable at maturity – which appears a reasonable evolution. Either way, should sense check the evolution of surrender values to ensure that these do not pose additional risk: for example, could a lower (or nil) surrender value be justifiable in initial policy years? Similarly, have the survival benefit of 25,000 payable in year 9 been appropriately accounted for when determining the surrender value for years 9 and 10?
- Check compliance against the applicable regulations for minimum surrender value: i.e. scale offered meet the requirements that a surrender value should be acquired after payment of premiums for at least two consecutive years, and the Company offers the stated duration-wise minimum guaranteed surrender values expressed as a percentage of premiums paid.

viii. Amounts: commissions

- Check implied commission rates against intended product features: The ratio of commission amount to premium amount should be compared against actual commission payable as per the product features for consistency. For instance, in first year, this is 7,000 / 20,000 = 35% and in subsequent years 5% only – is this intended?
- Sense check on reasonableness: The above ratios can also be compared against actual commission pay-outs for other similar products of the Company – are these implied rates an outlier in the Company's overall commission structure or are these consistent with what the Company pays its corporate agents for other products? Should also check the rates against any relevant internal Company policy and/or any contractual obligations in case there are specific distributor agreements in place with the corporate agents who are expected to distribute this product specifying a particular level of compensation.
- Check timing: Commission payments appear to be made only for up to 5 years, although premiums continue until 8 years – is this intended? Check if there is a valid reason to discontinue renewal commissions after 5 years.
- Check compliance against applicable regulations: On maximum permissible commission levels for corporate agency - the current scale of 35% initial / 5% renewal may need to be validated as the premium term is only 8 years – is the initial commission as per the regulations?
- Are there any commission over-rides that the Company applies that need to be considered and have these already been built into the projected scale of 35% initial / 5% renewal?

ix. Amounts: expenses

- Check whether the projected expense loadings are consistent with the intended expense assumptions: i.e. 3,000 initial expenses and 500 p.a. renewal expenses, inflating each year.
- Check the implied rate of inflation: Whether the implied inflation (=525 / 500 -1 = 5%) is also consistent with the intended assumption? May also check if the inflation is set constant throughout the projection period or whether a time-dependent assumption is intended to be used by looking at the ratio of each year unit expense with prior year's unit expenses.

- Check reasonableness of the expense amounts: By comparing against internal Company data, particularly the most recent expense investigation to see how the assumed unit expense loadings compare with those derived from latest expense investigation. Consider if there should be reasons for these to be different for the new product and/or given the distribution channel is largely expected to be corporate agency.
- Are there any commission over-rides / sales related costs that the Company applies that need to be considered in case not already built into the commission loadings?
- Validate reasonableness of the assumption: If it is possible to obtain, gather "market intelligence" or benchmarking data for experience with respect to similar products offered to similar target customer segments through corporate agents by competitors and/or assumption used by peer group companies to assess reasonableness of internal estimates against market data.

x. Cash-flows

- Check accuracy of cash-flows such that the correct probabilities are applied to corresponding amounts as follows. For example:
    a. CF_Premium = in-force (at start of step) x premium amount
    b. CF_Death benefit = number of deaths x death benefit
    c. CF_Survival benefit = in-force (at end of step) x survival benefit
    d. CF_Surrender benefit = number of surrenders x surrender benefit
    e. CF_Commission = in-force (at start of step) x commission payable
    f. CF_Expenses = in-force (at start / mid of step) x unit expense loading
- We can check reasonableness of each of the cash-flows by considering various ratios and average factor checks, such as the ratio of present value (PV) of each of the cash-flows and PV of CF_Premium. This would allow us to compare the overall proportion of premiums that are paid out in benefits / expenses or commissions over the lifetime of the policy and whether these ratios appear reasonable.
- A further reasonableness check may be constructed by scaling up the cash-flows for expected volumes. Do the overall aggregate premium volumes / benefit amounts and expense / commission amounts justify launch of this product and are the cash-flow looking viable, taking into account expected new business volumes? Are the expense / commission levels likely to result in material expense over- or under-runs?

xi. Mathematical reserves / increase in reserves

- Check that the reserves are computed by applying appropriate margins for adverse deviations (MADs) over best estimate assumptions as approved by the Appointed Actuary and relevant to this product.
- It is likely that the reserves are computed on a gross premium valuation (GPV) basis considering a cash-flow projection similar to that set out here with cash-flows being projected on a prudent basis and discounted using the valuation rate of interest. If available, compare reserving cash-flows with the best estimate cash-flows to ensure amounts (excluding probabilities) are consistent between the two and the only differences that arise are genuinely due to the change in projection basis.
- Check that the reserves are accurately computed for in-force policies only (i.e. by applying in-force probability at end of each step using the best estimate probabilities)
- Check reasonableness by comparing reserves as a percentage of discounted net cash-flows to ensure there are sufficient margins in the overall reserves at all future time-steps to meet the best estimate future net outgoes.
- Check that the increase in reserves (t) = Reserve (t) – Reserve (t-1).

- Check that the sum of the increase in reserve vector equals nil (i.e. full life time of the policy is considered allowing for build up as well as release of the reserves).

xii. Investment returns

- Estimate the implied interest rate by considering projected investment returns / (reserves at start + net cash-flows subject to investment returns) and whether this is consistent with the intended assumption.
- Check reasonableness of the assumption itself – Whether it is consistent with the intended asset mix for the product and expected returns for each asset class. Does this sufficiently allow for the expectations of the future interest rate or is the assumption too aggressive / conservative?
- Check if the gross investment return assumption has been netted down for an assumption for investment expenses - i.e. whether this is implicit in the investment return cash-flow or allowed for explicitly as part of unit cost loadings?
- Validate reasonableness of the assumption: If it is possible to obtain, gather "market intelligence" or benchmarking data for experience with respect to similar products offered and/or assumption used by peer group companies to assess variation of internal estimates against market data.
- Check that the timing of cash-flows used for projecting investment returns is consistent with the timing assumed when determining probabilities and estimating the cash-flows themselves i.e. whether considering full year's interest or half a year's interest or nil interest on relevant cash-flow implies start of year / mid of year / end of year timing assumption. This should be consistent between probabilities used and interest applied for all cash-flows.

xiii. Profit before cost of capital / PV of profits

- Check accuracy of the cash-flow and ensure all relevant component cash-flows have been captured, i.e. profit should equal (CF_Premium + Investment returns), i.e. incomes *less* (CF_Death benefit + CF_Survival benefit + CF_Surrender benefit + CF_Commission + CF_Expenses), i.e. outgoes *less* (increase in reserves)
- Calculate the net present value (NPV) of the projected cash-flows to compare with the present value of future profits (PVFP) provided (1,454). Is the implied discount rate consistent with the intended assumption for the risk-discount rate (RDR)? Is there sufficient margin between the RDR and the investment return assumption to capture the relevant risks under the product and the distribution channel for pricing purpose?

xiv. Solvency margin / cost of capital

- Check that the projection of solvency margin uses correct factors for a non-participating savings product type for both reserves and sum at risk and is calculated accurately as the sum of % of reserves and % of sum at risk. Should also check whether the control level of solvency (based on the regulatory minimum of 150% or an appropriate internal target, if relevant) has been allowed for in the cost of capital computation.
- The cost of capital in each step should be estimated as required capital (at start of step) x (RDR – interest rate), and the present value of yearly cost of capital should be calculated at the same RDR as that used for determining PVFP. Check that this approach to calculating the PV of cost of capital is consistent with calculating it as the discounted present value of (net of tax interest on solvency margin *less* increase in solvency margin) calculated at the RDR.

xv. Profit after cost of capital (CoC) / PV of future profits (PVFP)

- Check accuracy to ensure PVFP less CoC = VONB
- Check PV of premiums is calculated using the same discount rate as PVFP and PV CoC

- Assess reasonableness of margins based on internal targets; internal benchmarks for profitability on similar products / lines of business; and external benchmarks (if available).
- Check if the implied annuity factor is reasonable taking into account the assumptions made. The implied annuity factor can be calculated as PV of premiums / annual premium.

Other checks:

xvi. **Missing items:** Aside from checking items for which outputs are provided, one should also check for items that are missing from the cash-flow outputs. In particular, the following items appear to be missing in the current workings:

a) **Tax**: No allowance seems to have been made for impact of taxation on the profitability of the margins derived in the outputs provided. It should be validated with the pricing team whether this is intentional e.g. if surplus from this product is tax exempt, for any reason; or are there unutilised tax loss credits that are being assumed to offset any tax liability throughout the lifetime of the product. Either way, an appropriate challenge may be offered with regards to the applicability of these (or any other) working assumptions. In case impact of taxation has been omitted in error, then this should be allowed for appropriately.

b) **Reinsurance**: No allowance is made in the cash-flow outputs for any cost (and benefit) from entering into reinsurance arrangements. Should check whether any reinsurance applies and whether this is likely to be material for this product.

c) **Product features not modelled**: There are several (potentially minor) product features that are not explicitly captured in the cash-flow output. For example, likelihood of premium discontinuance leading to reduced paid-up benefits being offered as opposed to a termination of the policy following payment of surrender benefits; impact of free-look cancellations; impact of any special terms (or extra premiums) applied due to underwriting stipulations (like extra mortality loading) etc. The relevance of omitting these items should be assessed and it should be validated that these do not result in a material (or, as a minimum, adverse) outcomes for the Company. We should also check for any other options available as part of the product features (for example, any options to policyholders to receive benefits as an annuity rather than a lump-sum) or any other features of the product that are not captured and ensure these are appropriately allowed for.

xvii. **Sensitivities and policyholder IRR**

a) We may also wish to test the cash-flows and results under different sensitivities in order to assess the various risks that the product is exposed to, as well as to use this as an indirect check on the calculations themselves. For example, a lowered investment return assumption should result into a lowered profitability of the product. If the sensitivity results show anything contrary to this, it may indicate a calculation error in the pricing.

b) Is the policyholder IRR at a reasonable level? Would this product meet any regulatory minimum requirements for a minimum IRR to the policyholder?

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ii) The following items could be investigated to see whether it is possible to reduce the new business strain:

1. Reserving basis – Whether the margin for adverse deviations (MADs) applied are too onerous and can be lowered?
2. Expenses and commissions –
    - Whether the expense and commission loadings are excessive and can be lowered?

- Whether the expense loadings can be expressed differently (e.g. more as a % of premium)

3. Average case size – Is it too low for the given channel / product type?
4. Solvency margin – Is the internal target for control level of solvency too onerous?
5. Surrender value and lapse rates -
    - Whether the surrender value in initial year can be lowered?
    - Whether any change in surrender values in initial year would necessitate revisiting the first year lapse assumption?
6. Tax – Whether tax credit on new business strain should be allowed?

[4]

iii)

The following adjustments would be needed to the TEV cash-flows to estimate profit margins on a "market consistent" (MC) basis:

- Revisit "best estimate" operating assumption to align with glossary definition – ideally, there should not be any "implicit" margins in the best estimate assumptions for mortality / persistency / expenses within the TEV cash-flow projection as well. But this may need to be considered more critically when considering MC basis, to ensure that the best estimate reflects the mean outcome of the risk variable without any bias.
- If the MC approach adopted in estimating the EV is on an Indian Embedded Valuation (IEV) approach, the expense loadings reflected in the calculation of the MC-cash flows may need to allow for actual expenses incurred by the Company in the previous year rather than best estimate / 'steady state' expense loadings. However, an assessment may need to be made whether it is appropriate to do that for the purpose of pricing, particularly if the Company continues to experience expense overruns and reflecting the same in pricing may result in the Company's product being uncompetitive in the market.
- Replace the best estimate investment return assumption with an appropriate proxy for a risk free rate. This may require projecting investment returns using an appropriate time dependent reference yield curve as opposed to a constant assumption made over time that may have been adopted in the TEV cash-flows. This would mean that any risk premia based on expected asset returns for riskier asset classes in the TEV cash-flows will be stripped out and all assets / cash-flows will be assumed to earn the risk free rate. This may be adjusted for any investment expenses, if applied.
- Replace discounting at the RDR with discounting at the risk free rate – the same risk free yield curve used for projecting investment returns (gross of any investment expenses) would be used for discounting profits as well.
- Align the expense inflation assumption to the assumed risk free rates.
- Based on the above adjustments, we would get a MC PVFP, which would be different from the TEV PVFP, primarily due to the change in the economic basis as described above. There is a need to then make the deductions as discussed below from the MC PVFP so derived.
- The MC PVFP may need to be adjusted for the following:
    1. **Frictional cost of capital (FCoC)**: The cost of capital charge obtained under TEV cash-flows due to the difference between RDR and best estimate investment returns would no longer be relevant. Instead, one of the deductions necessary would be in respect of FCoC, which would allow for tax on investment returns (assumed at risk free rates) earned on the required capital and investment expenses incurred on the required capital. The projected tax and investment expenses should be discounted at the risk free yield curve as well, to obtain the deduction for FCoC.

2. **Time value of financial options and guarantees (TVFOG):** An allowance is required to be made for the asymmetric impact on shareholder cash-flows of any embedded financial options and guarantees. For the given product, described as a non-participating money back product, insofar as there are no variable benefits payable as per the product features and the projected benefits are contractually fixed / guaranteed with all surplus / deficits arising accruing to the shareholders in full, then it is likely that TVFOG for this product is nil. However, a critical assessment should be undertaken to ensure that there are no implicit or explicit guarantees that would have such an asymmetric impact and once established, then we can consider TVFOG for this product to be zero. If there are any likely asymmetries, then a stochastic assessment might be preferable though other closed-form solutions could also be explored to quantify the impact of the asymmetry.

3. **Cost of residual non-hedgeable risks (CRNHR)**: A final adjustment may be required to allow for all residual and non-hedgeable risks not allowed for already in PVFP and TVFOG. This would include an allowance for both non-hedgeable financial risks and non-financial risks and consideration would need to be given to:
    - Difference between the best estimate assumption and theoretical mean expectation of outcomes of the risk variable;
    - Asymmetries in the impact of the risk on shareholder value;
    - Risks not allowed for elsewhere (e.g. operational risks);
    - Allowance for uncertainty;
    - Any areas where calibration of the model to the market does not fully mitigate the market risk (e.g. in case of insufficient market data or where data is based on markets that are not deep and liquid);
    - Diversification benefits across different risks; and
    - Choice of an appropriate method for computing CRNHR (e.g. a cost of capital approach may be suitable).

The MC PVFP with the above mentioned deductions would give the so-called market consistent value. A MC new business margin may be computed for comparison with the corresponding margin on a TEV basis, by either expressing it as a percentage of first year premium or PV premiums, where PV of the variable CF_Premium is determined by discounting using the risk free yield curve.

[12]

iv)

The following tasks would be needed to estimate the value that a new distribution arrangement with a bank could create for the Company:

1. At the outset, we need to determine the term of the distribution arrangement. This may be contractual or we may need to make a working assumption for the purposes of the investigation. This would typically be 3 to 5 years, but may be longer (e.g. 10 years).

2. The value to the Company from this distribution arrangement can be developed using a combination of projected sales volumes, incremental channel specific expenses required to be incurred, product profitability for the products that may be sold by the bank and the discounting of the resulting profitability of future new business. We would need to consider each of these in turn to develop an overall view of the value that may be created.

Projected sales volumes

3. We know that this is not an exclusive distribution arrangement. Hence it is important to understand how the tie-up with multiple insurers work at a practical level – i.e. would our Company be granted access to all customers (loans / current and savings account or 'CASA' / credit cards etc.) of the bank through all its sub-channels (e.g. via branches / tele-marketing / mailers / online on bank website etc.) or would there be segmentation of access to different customers / channels for different insurers? It would be important to understand the degree of access up-front.
4. Once it is determined what access is available in the bank and how many years of sales we are projecting, the next task would be to assess the likely sales volumes the bank could generate year on year for the Company – both in terms of number of policies as well as in terms of premium volumes.
5. This could be done either following a 'top-down' approach or a 'bottom-up' approach as follows:
    a. The 'top-down' projection of sales volumes could look at the overall expected growth rate of new business sales from the bank. We should look at the volumes (and growth) in sales by the bank for its existing bancassurance arrangement to get an initial view of the likely potential. This overall growth could be linked to both greater penetration in the bank for insurance sales to existing customers as well as growth in the banking operations itself. Based on the different customer segments / sub-channels, we could assess the expected penetration into each to gauge the likely growth potential.
    b. Alternatively, a 'bottom up' approach could look at the various customer segments and sub-channels and consider the level of resources required to be deployed (e.g. number of branches that are "activated" for selling insurance policies / number of front line sales staff of the bank at the branches that needs to be trained to generate insurance sales leads / number of relationship managers per bank branch or office that needs to be deployed / volumes of marketing calls made from the banks' call centres themselves etc.). Once the resources available and deployed are established, we would need to work out the level of productivity for each of these in terms of number of policies sold per month via each of the above "resource". Along with an assumption for average case size (which may be increased each year by likely inflation of average policy size), this would then give an output for projected new business premium from the bank. Growth would be determined based on increase in resources available / deployed; higher productivity; greater case sizes or typically, a combination of these over the projection period.
6. Regardless of whether adopting a top-down or a bottom-up approach initially, we should ideally assess both to ensure that the sales volume projected are reasonable from either perspective.

Incremental channel expenses

7. We would need to consider incremental costs of having the bancassurance tie-up. These would include direct channel related expenses such as initialisation (set-up) costs of on-boarding the bank, training and recruiting relevant sales staff, direct channel marketing expenses, cost of "resources deployed" consistent with the projected sales volume and any other incremental expenses expected to be incurred.

8. Of critical importance would also be the direct commission expected by the bank. This may be contractual or equivalent to commissions payable to other bank distributors currently or any other basis.

9. We should also assess the increase in expense levels for the head-office operations itself due to the greater sales volumes, e.g. would the increased sales volumes result in need for larger teams to support increased underwriting / claims / customer services and other operational departments (including support functions such as IT, Finance, Actuarial etc.)? It is possible that the increase in such costs is not directly proportional to the sales volumes due to efficiencies and economies of scale, although there may be an indirect impact of overall increase in scale.

   It is important that the incremental expenses are commensurate with the sales volumes we expect to generate. In particular, care needs to be taken to assess the minimum level of "critical mass" of sales that is required to support the expected sunk costs of on-boarding and implementation of the new distribution channel.

10. Finally, we should determine a reasonable allocation of existing over-heads of the Company to the new distribution channel (e.g. senior management time and effort required / allocation of existing operating and support function costs etc.).

Product profitability

11. Although the new non-participating money back product is expected to be sold primarily through the new bank distribution arrangement, the bank itself may sell other products of the Company. Thus, for the projected sales volumes (policy counts and premium volumes), we should determine the product mix expected to be achieved by the bank for the various products offered by the Company.

12. We should assess the product profitability based on projection of product-level cash-flows for the expected future new business, using relevant operating and economic assumptions. The product features would be modelled explicitly for the cash-flow projections. This would require:
    a. Determining representative model points for each product;
    b. Modelling product features and projecting model point cash-flows;
    c. Scaling for new business volumes expected to be generated year on year;
    d. Aggregating cash-flows across all products.

13. The product level cash-flows themselves would have an assumption for unit expenses built in. The aggregate cash-flow for loaded expenses from the product models should be compared with the expected channel expenses, and an adjustment may be required in case of any over-runs (particularly in the initial years of the arrangement when the set-up costs and some marketing related spends may be disproportionately higher).

Value of the distribution opportunity

14. Based on the above, the overall value to the Company from the new distribution arrangement would be the present value of future profits to the Company expected to emerge from the sale of insurance products by the bank, adjusted appropriately for the channel expenses.

15. It may be noted that the discount rate to be used whilst discounting the future profits needs to appropriately allow for the risks associated with the ability of the bank to deliver the projected new business volumes at the implied profitability of the various products. Ideally, this may be higher than the base RDR used. However, applying a higher RDR on the aggregate profits projected from the distribution channel may imply that the profitability of each future year of new business would be

lower than that of the previous year's business. An alternative approach may, therefore, be considered that:

a. First calculate the value of new business (VONB) in respect of each future year's of projected sales. This can be calculated by applying the calculated VONB margins to the new business sales volumes in each of the years in the future. An explicit adjustment may also be required for any expense overruns arising due to the incremental channel expenses.
b. Discounting the resulting VONBs with the higher RDR to allow for the additional risks associated with the ability of the bank to deliver the projected sales volumes at the implied profitability.

[16]

[50 Marks]

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