

INSTITUTE OF ACTUARIES OF INDIA

CA1 – PAPER I (INDICATIVE SOLUTION)

MAY 2012 EXAMINATION

Solution 1 : The Company may have concerns about conflict of interest in getting the valuation done by an actuary who is also an employee.

Company's internal actuary is an employee of the organization and also a member of the pension scheme.

As an employee he has an interest in the bottom line of the organization as his variable pay may be linked to the same. In fact if he is a senior member of the staff his variable pay can be expected to be significantly high. Accounting provisions impact bottom line.

Being a member of the scheme on the other hand, he can be expected to have concerns about the security of his benefits and it might be perceived to influence his judgment (especially if his near retirement).

In some professional bodies, only an actuary holding certificate of practice and satisfying Continuous Professional Development requirements in that specific area is eligible to provide advice on accounting provisions for employee benefit schemes. There may be no actuary in the life company who satisfies this requirement.

In some countries there may exist legislation or regulation to ensure that the valuation can only be done by an independent external actuary.

The external auditor of the company may have requested for report from an independent actuary.

[4]

Solution 2 :

(i)

Impact of class selection

- The current product is being offered through Tied agency channel. The target market of this channel could be blue collared workers, persons belonging to lower socio-economic groups etc.
- The IT industry would have a predominance of professionals e.g. Software engineers, Hardware engineers etc – only white collared employees. (better class selection)
- The employees of the IT company could likely be more health conscious due to their educational background and be expected to take better care of their own health . (better class selection).
- Employees would be financially well off and can be expected to easily avail quality medical facilities. (better class selection).
- In IT company more younger employees are likely to join and hence overall lower average age with lower mortality experience can be expected. (better class selection).

Reduced anti-selection

- Purchase of Life Insurance by individual customers is likely to be voluntary decision. One can expect a certain degree of anti-selection in such purchases.

On the other hand the instance of anti-selection is reduced in the group scheme as

- The cover is compulsory for all employees. (less anti-selection).
- Employees do not join a firm for insurance. The insurance cover is incidental to the employment. (less anti-selection).
- Premium is paid by the employer only as the scheme is non-contributory in nature(less anti selection).
- Life over is pre-determined and based on an objective formula (multiple of salary). The employee does not have any choice as to the level of cover. (less anti-selection). Although a life insurance company performs financial underwriting in respct of

individual policies, this is likely to be done when Sum Insured crosses certain limit[risk of anti-selection] .

Underwriting and Screening

- Full-time employees of reputed firms would typically go through health screenings at time of recruitment. Individual customers of protection products also go through a medical underwriting process, but this is likely to happen when the sum assured crosses a limit.
- Those in ill-health are unlikely to be employed. (better selection).
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- Less healthy or ill employees have a greater tendency to leave employment since they may no longer be fit enough to work.

(ii)

Risks of quoting a single unit rate -

- single rate would work well for a stable group where older employees leave at retirement and new employees join – so that the average age remains unchanged
- For a rapidly growing company in the IT sector it would be difficult to predict the membership composition in terms of age, gender etc – all of which would have an impact on the single rate
- In particular, the single rate would be very risky to use if there are major changes in the workforce (mass retrenchments, mergers etc)
- Single rate on benefit based on salary would show high premium for high CTC and low premium for low CTC, as the rate is same irrespective of age.
- If the higher CTC is for a younger employee and lower CTC for an older employee, the absolute premium amount would be higher for younger than older in line with cover.

The increase in premium directly in proportion to the cover, in spite of differences in age might not be easily understood/justified to the younger employees leading them to believe that the benefit provided by insurance company "does not provide good value for money" and could lead to loss of business.

- If the group is geographically spread, members of the same group are likely to be exposed to differing risk factors. For eg., members resident in tropical regions, areas more prone to terrorist attacks etc. A Single rate would not appropriately reflect higher risk associated with risky regions and there would be cross subsidy among members. If the group composition changes by geographical location then using a single rate would be inappropriate.

[9]

Solution 3 :

(i) Assertions to be examined

- that a liability or asset exists on a given date
- that a liability is held or an asset is owned on a given date
- that when an event is recorded, the time of the event and the associated income or expenditure are allocated to the correct accounting period
- that data is complete, ie there are no unrecorded liabilities, assets or events
- that new entrants to the scheme since the last valuation have been included and that no categories of member (eg senior management) have been excluded from the data
- that the appropriate value of an asset or liability has been recorded.

(ii) There are several possible checks that could be done -

Reconciliation of the total number of members and changes in membership, using previous year's data and movement data.

The reconciliation of movements of members is useful in providing an early indicator of any trends occurring within the benefit arrangement.

Reconciliation of the total benefit amounts and changes in them, using previous data and movement data.

The movement data should be checked against any appropriate accounting data, especially with regard to benefit payments.

Data integrity Checks should be made for any unusual values, for example, impossible dates of birth or retirement ages or start dates.

The data should be checked against previous valuation records to ensure dates that should have remained fixed (eg dates of birth) have not changed.

Consistency between salary-related contributions and in-payment benefit levels indicated by membership data and the corresponding figures in the accounts.

Consistency between investment income implied by the asset data and the corresponding totals in the accounts.

Where assets are held by a third party, reconciliation between the beneficial owner's and the custodian's records.

Full deed audit for certain assets, for example checking the title deeds to large real property assets.

Consistency between holdings of various shares and securities at the start and end of the period, adjusted for sales and purchases, and also bonus issues in respect of shares, etc.

Random spot checks on data for individual member's details or assets.

It will be particularly important to check data for members who have significant liabilities – since errors in their data records will have a significant impact on the valuation result.

[9]

Solution 4 :

(i)

Sources of data

- National/ population statistics
- Standard Morbidity tables based on industry statistics

- Reinsurance data
- Standard Table available from other countries (similar race)
- Existing Insured lives data if cause of death/disability is recorded and data is statistically credible
- Data maintained by Hospitals

(ii)

Any publically available source of data needs to be adjusted for the following-

Definition of Critical Illness

It first needs to be confirmed that the CI definition used in the underlying statistics is the same as that used in the policy. If not suitable changes needs to be done

First ever occurrence adjustments – Publically available may include data for whom the CI would not be the first occurrence. For eg. Many people may have two or more myocardial infarctions in the course of their lives.

CI insurance, will however, cover only the first infarction after commencement of the policy and ceases after that event.

Hence such cases should be excluded from the publically available data before use for pricing.

Overlap of conditions - Often one and the same health impairment causes the occurrence of several CIs one after the other.

As the CI cover ceases after the first claim, such overlap effects must be considered in the calculation of incidence rates.

For example, about every second patient undergoing a bypass operation would have had a myocardial infarction before.

The incidence rate of a bypass operation can therefore be reduced accordingly since asbenefits are paid only once.

Adjustment for selection – the effects of medical selection, anti-selection and moral hazard need to be estimated.

Mortality during survival period – Most CI policies will have a survival period. The CI benefit would normally be paid only to those who are still alive after that period. The probability of dying during the survival period would need to be subtracted from the incidence rate of the disease .

Trend – The publically available statistics used will be based on historical data. However, in order for them to be applicable for the pricing purpose, they must be investigated for improvement or deterioration.

[9]

Solution 5 :

(i)

The aims of good corporate governance is that a company should be

- Managed in order to best meet appropriate requirements of its stakeholders– the shareholders, employees, pensioners, customers, suppliers and others who may be affected by the company’s operations whilst not having any contractual relationship with the company at any time.
- A particular concern of corporate governance is that managers do not make decisions based more on their own personal interests rather than on the interests of the shareholders.

(ii)

a) A good corporate governance structure can be achieved by-

- Stating clear corporate aims and objectives - in terms of financial, operational and business objectives.
- The production of regular internal management reports to compare actual

performance with the aims, objectives and targets of the company - for eg.

achievement against sales, product profitability and Profit/loss targets, capital

adequacy, investment performance, TAT on policy issuance and claims settlement etc.

- The establishment of clear operating procedures for all critical processes for eg.- a well-documented underwriting process, product development and pricing process, investment management process, well controlled financial reporting process etc.
- Set up a system that checks that such procedures are being implemented - setting up of an internal audit team which conducts regular reviews of all key processes and test the effectiveness of controls etc.
- Setting up sub-committees of the Board like the audit committee, remuneration committee etc. which report directly to the Board in respect of financial/audit matters, remuneration of key management personnel.
- The appointment of independent non-executive directors to the Board to provide a more impartial view - since it is private company it may not have an independent director/s on Board. The Independent Board member could also head crucial board committees like the audit committee, remuneration committee etc.
- The regular publishing of audited internal and published accounts.- since it is a private company currently there might be limited statutory requirement to publish financial information.
- The development and recording of job descriptions for management with key accountabilities and limits on authority for eg. for key personnel like the- CEO, CFO, COO, CIO, Chief Actuary etc.
- The establishment of effective performance measurement practices to include the setting of performance standards, regular monitoring and feedback- with the remuneration committee of the Board being responsible for setting

performance standards and review especially for the key personnel.

- The implementation of remuneration schemes linked to individual performance (eg profit/value generation related pay), and/or corporate performance (eg share options schemes) especially for key personnel.

[10]

Solution 11 :

(i)

Immunization is the investment of the assets in such a way that the present value of the assets less the present value of the liabilities is immune to a general small change in the rate of interest.

(ii) There are three conditions that must be satisfied, for Redington's classical immunization theory to apply:

1. The present values of the liability-outgo and asset-proceeds must be equal.
2. The (discounted) mean term of the value of the asset-proceeds must equal the mean term of the value of the liability-outgo.
3. The spread (or convexity) about the mean term of the value of the asset-proceeds should be

greater than the spread of the value of the liability-outgo.

(iii) There are a number of theoretical and practical problems with immunization:

- Immunization is generally aimed at meeting fixed monetary liabilities.
- Immunization removes mismatching profits apart from a second-order effect.
- The theory relies upon small changes in interest rates.
- The theory assumes a flat yield curve and level interest rate changes at all terms.
- In practice, the portfolio must be constantly rebalanced.
- The theory ignores dealing costs.
- Assets of a suitably long discounted mean term may not exist.
- The timing of asset proceeds and liability outgo may not be known.

(iv)

Pure matching is not always possible for the life insurance company when:

- the liabilities are not known with certainty, *ie* they depend upon factors which do not affect the assets to the same degree – *eg* mortality of policyholders, expenses of administering policies .
- net new money is to be invested in the future – *eg* reinvestment of existing assets if sufficient long dated assets are not available,
- the initial income from the required assets is too large. This is possible if coupons are receivable on fixed interest securities and zero coupon securities/strips are not available.

Investment income is greater than the liability outgo, this is likely to be the case as the outgo from death benefits, expenses are likely to low .

- Non availability of assets with all terms for eg., assets with only specific duration may be available eg. 5, 10 , 15 year bonds etc.

[11]

Solution 7 :**(i)**

- (i) Online channel sales may diversify the customer base, but there are several risks on selling through online

There is increased potential for anti-selection.

Typically these types of products are aimed at mass market with low cover and easy issue basis. Fewer health questions are asked so mortality may be expected to be higher than for other channels.

Internet usage is higher amongst younger people, hence average age may be lower. Unfortunately, younger people may have a higher propensity to lapse their policy due to lack of steady work/income, greater propensity to change providers if they find a more competitive product or if they experience poor service.

No salesman is involved, which may increase lapses for this channel.

It may create “angst” among other distribution channels if internet channel eats into their natural market.

There are likely to be considerable development costs which will need to be recouped. There is a risk of lower sales leading to lower expense recoveries and hence loss.

Without the existence of face-to-face advice, there may be a tendency for people to underinsure themselves by paying smaller premiums, thus reducing the average case size and no fulfillment of proper customer need.

Premium rates will be comparable over the net and hence price has to be competitive /frequently reviewed to be relevant in the market. Otherwise, this will impact business volumes, expense recoveries and hence profits.

There may be expectations of additional service facilities from policyholders-eg, to make simple administrative changes online, such as change of address, nominee etc which may involve additional IT costs.

Since this a new channel for the company there are additional operational and IT risks like –

- IT down time/slow down load/up load/internet traffic impacting customer

experience and sales

- Issues relating to data security and protection of customer details- like credit card/debit card details etc which will require additional protection. Any breach will lead to significant loss of reputation.

Solution (ii)

Disadvantages of the proposal:

- By limiting its premium payment options, the company will be catering only to a limited market of High income individuals who can afford a large initial outlay required under a single premium policy
- Single premium will involve a larger initial investment than regular premium policy from a customer perspective. Regular premium can make a policy appear more affordable and hence increase sales volume for the company especially if its distribution channels cater to low income groups.
- Regular premium with monthly mode can help the customer to pay premiums by way of deduction from salary, which is more convenient for the customer and easy to administer.
- In comparing the market share, analysts may not give full value to single premium policies but instead give limited credit, significantly impacting market share by Annualized Premium equivalent. This could in turn impact future potential customer's perception about the market standing of the company.
- Regular premium policies provide frequent opportunities for interaction with customer. A satisfied customer is also a "repeat customer". Regular premium policies provide more opportunities for customer interface than single premium policies.
- Regular premium policies may be perceived by customers as providing higher value as the Sum Assured will be larger multiple of annual regular premium than a single premium policy.
- Purchasers of single premium policy might expect some surrender value to be paid in the initial years. Any surrender value that can be offered could appear small and unattractive and hence there is a risk of customer dis-satisfaction.

Advantages of the proposal:

- Regular premium policies are exposed to risk of lapse and re-entry especially if the term market is highly competitive and premiums rates are reduced frequently to corner market share. It is unlikely that single premium policies offer surrender benefits and hence risk of selective surrender and entry is reduced .
- Risk of lapse is considerably reduced ensuring that company is able to recover expenses.
- New Business Strain will be lower for a single premium product. This may be a beneficial to a company in a tight capital situation.
- The operational cost of managing a regular premium policy is higher as renewal notices have to be sent regularly to the customers. Premiums collected, records updated etc . Of course, the same can be reflected through a higher premium, but a competitive market will make it difficult.
- A single premium policy will be preferred by customers who are looking to purchase term insurance to cover mortgage or other loans.
- The uncertainty over future premium taxes (eg. service tax) in regular pay compared to single pay
- There is possibility of having high commission rate in regular premium than single and hence higher price for customer.
- High initial commission without claw back from the distributor in regular could reduce profits.

Solution (iii)

Most customers find insurance contracts with its terms and conditions, options and guarantees, exclusion clauses, benefits etc. fairly difficult to understand, more so if it is in complex legal language.

Communication is important in insurance sale process and in building a long term

relationship with a customer. Using Simple English it is an easy and a simple way to communicate policy terms and conditions without any technical jargon in very small simple sentences.

Using simple English will undoubtedly help the customers to understand the terms and conditions of the products. This would help to understand product design and bring greater appreciation of benefits under a policy.

Given that such an initiative is being undertaken for the first time in the market this would enhance the customer-friendly image of the company.

Some expertise will be required to do this. It may increase the cost to the company initially but over the long term bring benefit to the company through repeat sales from existing customers.

Policy wording in the documents received by the customer is the primary reference for any policy servicing issues and also hence will help to understand the service related/claims process.

This wording would bring more clarity in interpretation and hence there would be limited avoidable delays in claim process.

There may be some cost saving as far as the claim underwriting is concerned, due to more clarity less interpretation differences in claim eligibility.

Using simple English can put the company as a differentiator in the industry.

The simple wording will also help to reduce customer complaints as less ambiguity in terms and conditions. This will ultimately reduce servicing costs for the company in the long run

This may be appreciated by the regulator as this seems to be fair to the customer.

[15]

Solution 8 :**(i)**

- (a) The Insurer should select investments that are appropriate to the nature, term and currency of the liabilities and the insurer's risk appetite.
- (b) Subject to (a) the investments should also be selected so as to maximize the overall return on the assets, where overall return includes both income and capital.

(ii)

The suggested investment approach may not be appropriate since it could lead to the following:

- General insurance liabilities are typically short-term except for long tailed liability business.
- The proposed investment strategy could lead to mismatch by term for short tailed liabilities.
- Even for longer-tail insurance there would be a poor match by nature – since liabilities would be real, typically linked to price/wage inflation .
- Following a mis –matched strategy will require a company to have substantial free assets. It could enhance returns but the reverse is equally likely to happen impacting solvency or tying up capital. Capital could be better utilized by investing in the business .
- The shareholders and management should also have the risk appetite to follow such a mis-matched strategy.
- Fixed interest securities offer higher security but lower returns as compared to equities/property etc in the long term. Company could be missing out on good opportunity to enhance returns on its free assets by following this approach.
- Market values of medium/long term assets are volatile especially in a volatile interest rate environment which could lead to problems with statutory solvency if assets are taken at market value.

- Leads to too much concentration in a single asset class- though diversification can be achieved by investing in corporate bonds across sectors , there is still a systemic risk associated with investing in one asset class. This can only be reduced by investing across various asset classes.
- The assets may not be marketable – particularly for corporate bonds- there may be loss of value at the time of sale due to difficulty in finding a buyer.
- Some fixed interest securities are less liquid than equities and involve more dealing costs
- Similarly there could be credit-risks associated with corporate bonds which can be mitigated by investing in grade bonds but this will be at the cost of potential higher return. Some low grade bonds are worse than quality equities as regards credit risk.
- There may be tax disadvantages compared with other assets.
- Normally, longer dated securities offer a higher return than short dated assets. But in exceptional circumstances (downward sloping yield curve) the reverse can also happen. In such cases it may be more appropriate to invest short.
- If the interest rates are likely to rise, it may be more appropriate to invest short to protect against loss of capital value.

(iii)

The main uses are:

- administration
- accounting
- preparing statutory returns
- in making investment decisions
- financial control, management information
- risk management
- setting provisions (for example, setting aside reserves to meet future benefit payments)
- experience statistics
- experience analyses
- premium rating,
- marketing.

(iv)

If data is controlled by one single, integrated system then:

- There is reduced chance of inconsistent treatment of information across the organization and over time
- It improves IT security as there is likely to be a better level of control over those who may enter information or amend information.
- Information will be easier to access, *eg* it will not involve collating information from several systems.
- Time will not need to be spent reconciling data from different systems.
- In the long run this could lead to significant savings in expenses

(v) Risks of setting reserving with inadequate data

- Could lead to over-reserving or under-reserving
- Under reserving could lead to a short fall in funds and an inability to meet liabilities as they become payable
- Under reserving will speed up the payment of dividends and tax
- Over reserving will cause a reduction in the apparent published solvency margin causing a loss of confidence in the company if the true position is not considered
- The insurer's investment strategy would need to be more cautious than otherwise possibly reducing the overall returns to shareholders
- More reinsurance may be purchased, ceding more profits to the reinsurer.
- Risk of fluctuation in reserves year on year for no reason but data inadequacy leading to volatility of profits
- Risk of improper adjustment in the parameter values without having adequate data or a complete view
- Risk of regulatory displeasure resulting in a penalty or need to hold additional reserves for data inadequacy

- Risk of financial statement being qualified by auditor leading to loss of reputation.
- Poor rating by analysts leading to increased cost of capital, loss of customer confidence and hence future new business

[15]

Solution 9 :

(i) A newly formed general insurance company requires capital to:

- Even before commencement of business, it would initially require capital to set up shop, conduct prior launch development activities (like applying for license approval, conduct market surveys), employ and pay key personnel etc.
- In many jurisdictions a company needs to be capitalized at a certain level to be eligible for licensing to transact business.
- Post license it will need capital to meet minimum statutory solvency requirement as prescribed in regulation even though calculated solvency requirement will be small.
- It may need to be well capitalized above the minimum required levels to demonstrate financial strength to potential customers, business partners and investors.
- Since it is a new company it will incur significant marketing costs in building its brand , running product campaigns etc.
- To support aggressive pricing strategy if it is keen to build its market share fast
- To support risky, mis-matched investment strategy if it sees an opportunity in to

make profits by following such a strategy.;

- It wants to follow a prudent reserving strategy than what is statutorily required to support the uncertainty surrounding amount and timing of liability outgo (in fact it is likely that it may have volatile claims experience due to small size of portfolio).
- It could maintain prudent reserves than that required under regulations do to gain the confidence of potential customers, gain positive ratings from rating agencies.
- Meet new business strain due to the administration and management expenses, commission and any statutory reserve and solvency capital requirements involved. Since it is a new company it is likely that product expense margins are insufficient to cover actual management expenses. Capital is required to cover expense overrun.
- Invest in new cutting edge technologies which would result in business efficiency in the long run.
- Enable acquisitions of new business channels, third party sales tie-ups involving up front payments.

(ii) Different sources of capital –

- Equity capital
- Reinsurance – to reduce the amount of solvency capital required
- financial reinsurance (FinRe)
- subordinated debt
- banking products – including liquidity facilities, contingent capital, senior unsecured financing and derivatives

(iii)

The reasons could be-

- Differences in distribution model –
 - a. A Tied agency vs Banca model
 - b. Commission structure -a higher up front commission
 - c. Differences in sales development model in terms of assumed productivity, development of sales fixed costs etc. It is to be noted that the company being compared to started operations 5 years ago and impact of inflation on fixed costs would increase sales costs any way.
 - d. Different distribution channels leading to differences in target market impacting average policy size and hence expense recoveries
- Differences in pricing strategy
 - a. Aggressive pricing compared to competitor to gain market share leading to higher expected losses and capital
 - b. Premium rates were “hard” in the last 5 years and are expected to “soften” due to increased competition. Hence profitability/expense recoveries likely to fall leading to higher capital requirement.
- Differences in business mix,
 - a. Products being offered are not comparable- for eg. commercial vs personal, short tail vs long tail .
 - b. differences in product mix leading to different levels of profitability
 - c. Competitor has access to niche market (HNI clients/industrial houses) which enables competitor to offer higher margin/service intensive products,
- Different reinsurance strategy
 - a. Competitor places reinsurance with parent company which offers extremely competitive rates
 - b. Competitor is part of a global group and benefits from global discount
 - c. Competitor has placed reinsurance with lower rated reinsurers which offer competitive terms (and local solvency capital does not charge for credit risk)
 - d. Insurer is constrained by group guidelines/risk appetite to place reinsurance with highly rated insurers leading to higher reinsurance costs and hence relatively lower positive impact on solvency requirement.
- Differences in operating model-
 - a. Competitor is part of local/global financial conglomerate and benefits from shared

- back office costs, technical support from group which enables it to maintain a low overheads locally
- b. It receives support from regional/global team in actuarial, financial and other services which reduces its overheads costs significantly
 - c. It enjoys group discounts from global vendors
- Economic, business and regulatory environment has changed in the last 5 years
 - a. More restriction on investments than before leading to lower investment profits than before
 - b. Market has become more litigious and claims which have not been seen in the past are expected to arise in the future
 - c. Expected higher judicial interventions and customer friendly court awards in future
 - d. Higher expected compliance costs
 - e. General costs of running business and hiring and retaining skilled people has gone up
 - Others
 - a. Competitor enjoys a strong local brand and hence requires lower marketing spend
 - b. Gets a lot of captive business from group companies

[18]

[TOTAL MARKS – 100]
