

INSTITUTE OF ACTUARIES OF INDIA

SUBJECT CA1 –Paper I

OCTOBER 2009 EXAMINATION

INDICATIVE SOLUTION

1)

The principal risks associated with a portfolio of debt securities are:

- counterparty risk (leading to replacement risk)
- settlement risk (also sometimes referred to as credit risk) at the point the settlement occurs
- liquidity risk
- concentration risk.

Credit risk is more generally used to define the following types of risk event:

- changes in credit quality
- variation in credit spreads
- default events.

Credit ratings give an indication of the likelihood of default.

[4]

2)

a) Rack rent is the rent that would be received from a building if it were subject to an immediate open-market rental review. This may be different from the rent actually being received.

b) Property can be valued using an explicit discounted cash flow approach.

Formula: $\text{Value} = R \times (\text{annuity factor for 5 years}) + Sv5$

R = passing annual rent

S = value of site assuming vacant building

Assume that:

- rack rent is lower than passing rent throughout five year period
- rent is payable monthly and that
- the building cannot be re-let due to its age

c) The benchmark would be a 5 year bond as no growth would be expected.

[4]

3)

An individual investor

Advantages

- Expertise available within CIV
- Diversification even for a small investment
- Access to investments which cannot be accessed directly eg property
- Lower dealing costs than if invested directly
- More marketable
- More divisible
- Can be more tax efficient

Disadvantages

- Loss of control over investments
- Have to pay management charges
- Possibility of tax losses

Institutional Investor

Advantages

- Expertise in specialist sectors- overseas investments, property
- Ability to get exposure to new sectors
- Diversification from direct investments
- Possible tax advantages
- Exposure to gearing/narrowing of discount to NAV to enhance expected returns

Disadvantages

- Loss of control over investments
- Have to pay management charges
- Possibility of tax loss

[4]

4)

- a) Economic capital is the amount of capital that a provider determines it is appropriate to hold given its assets, its liabilities, and its business objectives.

Typically it will be determined based upon the risk profile of the individual assets and liabilities in its portfolio, the correlation of the risk and the desired level of overall credit deterioration that the provider wishes to be able to withstand.

- b) The key components of an Economic capital balance sheet are-
- a. Market value of provider's assets
 - b. The market value of provider's liabilities
 - c. The provider's available capital which is defined as $MVA - MVL$
- Provider's AVAILABLE capital is then available capital compared to economic capital required to assess solvency status
- c) VaR and Tail VaR are risk measures used to calculate economic capital /internal capital

VaR called value at risk measures the expected short fall of assets relative to liabilities by identifying the worst $x\%$ level of the future scenarios. The capital requirement may then be set to such level that the company is solvent over a chosen time horizon with a $(1-x)\%$ confidence interval

Tail VaR measures the expected shortfall (assets relative to liabilities) in the lower $x\%$ tail of the distribution. With this risk measure companies would be required to hold capital to meet this expected short fall

For a VaR confidence interval of $x\%$, Tail VaR confidence interval will be greater than $x\%$

[6]

5)

- a) Strategic risk is the risk of the strategic benchmark performing badly relative to the value of the fund's liabilities

Structural risk that the sum of all the various benchmarks given to individual managers does not equal the total benchmark of the fund

Active risk is the risk that the assets a manager chooses performs poorly relative to the benchmark given to those managers

- b) Strategic risk- is that strategic bench mark chosen 80% equity and 20% performs poorly to the chosen liability split of 50% equity, 30% property and 20% bond.

Strategic also covers the risk that the portfolio thought to best match the liability (50% equity, 30% property and 20% bond) profile underperforms the actual liabilities.

This is likely to be the case as the notional portfolio is more weighed towards real assets than the liability profile. The 20 year bond chosen will not exactly match the fixed in "money terms" liabilities

Structural Risk-

- The bond manager's benchmark is a chosen bond index where as the investments are in 20 year bonds. The sum of aggregate benchmarks Will not equal the strategic bench mark set by the investor

Active risk-

- equity manager has the mandate to manage the portfolio actively . Risk that stocks chosen may underperform the domestic equity market the
- he is also unlikely to invest in all stocks in the market but only in few stocks
- bond manager is expected to manage passively which still is not a guarantee that performance will be exactly in line with index

[7]

6)

Attractiveness is based on margin of expected return over required return

Asset	Expected return	Required return	Ranking
Index Linked bond	$1.5\%+2.5\%=4\%$	$1.5\%+2.5\%=4\%$	4
Conventional Bonds	5%	$1.5\%+0.5\%+2.5\%=4.5\%$	2
Equities	$3.75\%+1\%+2.5\%=7.25\%$	$1.5\%+2.5\%+3\%=7\%$	3
Property	$6\%+0.25\%+2.5\%=8.75\%$	$1.5\%+2.5\%+3.25\%=7.25\%$	1

[8]

7)

Private debt placement, issues to consider are-

- Risk vs return attractiveness of the investment relative to other available opportunities,
- Level of security (asset cover, interest cover, are collaterals being offered, order of priority in winding up), is any credit rating of issue available.
- Reason for which money is being raised
- Level of information available about company- past track in repaying debt, management efficiency, promoters, their track record
- Marketability and liquidity – is unlisted, private placement, likely limited holding and marketability
- Level of diversification- Any other exposure in same company, industry, sector

a) Equity

- no regular return, no cover and last priority in case company is wound up.
- Risk vs return- expected listing price, price at which offer is being made
- The extent of shareholding, is there likely to be board re[presentation, control on management, is this in sync with institutional investors' objectives
- Likely wind fall gain If listed –this will depend on pricing at listing
- Future prospects of company, earnings, estimation of listing price, how many years to list
- Other option of exit- if in need of liquidity
- Marketability and liquidity prior and post listing

[8]

8)

Liability profile-

- Fixed in monetary terms
- Term is uncertain as it is dependent on longevity of immediate annuitant customers

a) Risk in the proposed investment strategy –

Mismatch risk –

- All exposure to 20 year bonds, where as the duration of bond portfolio should be in sync with liability duration
- Liability duration is itself a function of longevity assumptions

Marketability and Liquidity risks

- The annuity will be made of 2 components –part return of single premium and the interest component. The coupon payments may not be adequate to pay for the annuity. Hence it would require liquidation of securities. The securities may not be marketable/cannot be converted to cash immediately

Interest rate risk

- The interest rate movements will impact the price at which securities can be liquidated for payment of annuity

Re-investment risk-

- If the coupons are more than the annuity rate then there is re-investment risk associated with investment of coupons

b) Alternative product design

Mismatch risk

- Coupons may be inadequate to cover the annuity payments. Can lead to risk of liquidation of securities or re-investment risk
- The liability duration is a function of longevity and may not be equal to a 20 year bond. Hence there is risk associated with adverse interest rate movements.
- The payment of single premium on death there is risk that securities may need to be liquidated in adverse market assumptions
- Risks associated with poor marketability of government securities
- Reinvestment risk- if actual payout lasts more than 20 years then there is re-investment risk associated

Mitigation

- Duration should be based on duration of liability cash flows, Required are best estimate longevity assumptions, try and match duration instead of investing in 20 year bonds flat
- Longest dated bond is 20 years and the liability duration could be higher than 20 years, in which there is a need to relook at the annuity design and possibility of re-setting annuity rates beyond the 20 years
- Hedging strategy can be examined, if available to protect against down side from falling interest rates
- Reinsurance if available for longevity risk,

[8]

9)

The three types of advice are:

- Indicative advice – Giving an opinion without fully investigating the issues, for example in response to an oral question.
- Factual advice – Advice based on research of the facts for example Interpretation of legislation.
- Recommendations – Advice based on fully researching the requirements and weighing up the potential alternatives, for example specific advice about decisions to be taken.

(ii) Before providing advice the actuary should consider

- whether he has the necessary experience to provide the advice. The actuary may need to consult other actuaries, for example from within their firm, who have the relevant experience.
- Alternatively the actuary may have his work peer reviewed.
- Avoid conflicts of interest- the actuary should be aware of any conflict of interests. Conflicts could arise if the actuary is advising more than one associated party or from within the insurance company.

- Compliance with professional guidance notes or local legislation.
- The interpretation of legislation and accounting requirements, if relevant.
- Since this relates with internal capital model he might not have qualifications to act without involving other professionals such as investment managers, experts in operational risk, etc. He should be aware of the need to take assistance from other professionals as and when required.

[8]

10)

Possible courses of action

Closure/curtail new business production

- Reduce/closure to new business which will reduce new business strain and supervisory capital required for supporting ne business
- This is a short term immediate solution but in the long run run off of existing portfolio will reduce economies of scale and all expenses cannot be curtailed in line with the run off.

Reinsurance

- Increase reinsurance as it may reduce solvency capital requirement
- Financial reinsurance –financial support from reinsurer for writing new business where reinsurer shares in profits from the new business written. The loan repayment to reinsurer is contingent on future profits and need not be recognized as liability in books
Reinsurance is not free “share future profits with reinsurers”

Manage Investment strategy

- Reduce exposure to risky assets- this will help if risky assets higher solvency capital requirement
- Improve ALM and reduce mismatch risk which might be requiring higher provisions or solvency capital
This may impact competitiveness of products

Manage business mix

- If solvency capital varies with type of business steer the business towards writing more capital efficient business-unit linked vs traditional
- To Front end loading from back end loading, reduce guarantees, have variable charging structure
Might not be easy to implement if market requirements are the other way , risk of losing market share
Manage surplus distribution in with profit fund

- Shift from regular to terminal bonus
This may impact PRE and reduce transfers to shareholders
- Other measures-
- Rights issue to existing shareholders- dilution in Earnings per share, impact on share price
- Tier 2 capital- debt- cost of raising debt, impact on shareholders, approval of regulatory authority,
- Sell of certain line of business= price of realization, fair valuation, interested buyers, regulatory approval, loss of future new business

[12]

11)

a) Factors that need to be considered are-

- Current wealth and income
- Current expenses and liabilities
- Future income and expected level of money available for investment
- Future expenses/liabilities
- Future needs –increase in family size, new luxuries,
- Tax efficient investment strategy
- Diversification across asset classes
- Risk appetite of the investor

b) Current situation

- Current wealth and income
 - Un married High level of certainty of income from rental income from property and salary as he owns substantial stake in company
- Current expenses and liabilities
 - Day to day living expenses
 - No other liabilities /expenses in terms of loan/mortgages,
- Future income
 - Expected salary will increase in line with inflation (if high component of variability in pay there will be degree of uncertainty)
 - Dividend income from equity holdings
 - Proceeds from sale of equity holding once listed
 - Expected rental income increasing in line with inflation
- Future expenses/liabilities are expected to increase as he is married
 - increase in family size , new luxuries, expenses on luxuries- a new car, a bigger house, medical expenses,
- Future needs
 - Increased dependents- spouse, children-protection requirements, increased costs for children education and other requirements
 - Medical expenses
 - Retirement

c) Five years down the line he is married with children

- wealth and income
 - Salary if continuing with same company or possibly new company or self employed
 - Income from spouse's occupation
 - he might have exited equity holdings in the IT company at attractive prices , which he might have invested, in other ventures or put aside for future needs, there is a certainty in value of equity holding as company is listed
 - Dividend income from equity holdings
 - Rental income if he continues to own the property- rental income could have gone up with inflation,
- expenses and liabilities
 - Day to day living expenses , which would have gone up due to increase in family size, children's education, medical expenses
 - New liabilities/expected- mortgage payments through new house purchase,
- Future income and expected level of money available for investment
 - Depends on his position 5 years –employed/self employed, salary etc.
 - Dividend income from equity holding and Rental income from property
- Greater certainty on Future expenses/liabilities as he is married and having children
 - Children education and marriage
 - Mortgage payments, closure of mortgage loans,
 - New loans on car and other luxuries
- Future needs (there will be greater degree of certainty on these requirements) and the amount of money that needs to be put aside
 - Providing for child education and marriage
 - Medical expenses for self, spouse and family,
 - Retirement savings

[13]

12)

Aim of additional assets is to ensure insures have adequate assets claims and expenses as and when they fall due

Since claims and expenses are based on estimates (incidence and quantum, investment return, claim expenses, ,management expenses etc) the actual experience can be different from expected and provisions may prove inadequate , hence the need for additional assets.

Any test for solvency should be –

- Objective and simple
- Easily verifiable
- Effective
- Easily understood and applicable

- Appropriate for a range of general insurer as there may be companies with different characteristics

A solvency requirement should not be looked in isolation but rather in conjunction with provisioning requirements.

In that context the proposed legislation has certain draw backs –

- Its premise is that general insurance is a very short term business and claims and premium patterns represent a fair cushion to reserves held. However, certain types of general insurance business have a long tail and to that extent the proposed measures might not be appropriate.
- Claims paid and premiums received are taken as an appropriate measure. These are objective, easily measureable and consistent treatment across companies (assuming accounting policies are uniform across companies). However, better measures would have been claims incurred (which would include IBNR claims, IBNER claims) and earned premiums, rather than premiums received.
- 2 parameters are averages over last 3 years average which might not rightly represent the actual current experience or future experience.
- The averages might hide worsening trends or change in trends over the period. For a company growing very fast the % might appear lenient and for companies slowing down in growth the % appear penal.
- A more appropriate basis could also be to consider setting aside additional assets expressed as a % of provisions. This will take care of incurred claims and provisions for future claims (including long term claims). Moreover, premiums would not necessarily reflect the level of risk taken as premiums can be set at competitive levels.
- Of course, it is also mandatory to prescribe principles behind calculation of provisions.
- Otherwise a company holding prudent provisions would end up holding additional free assets.
- Assessing the value of extra assets is simple and objective and easily verifiable. However, there might be some assets for which market value is not available.
- Again, looking at valuation of assts in isolation is not appropriate and needs to be considered in conjunction with value of provisions-
 - If market value is used than provisions must be calculated using market related discount rate
 - If there is no consistency then insurers might be solvency one day and fail the test the next day
- Moreover, this proposed criteria does not allow for-
 - The various classes of insurance business(short tail, log tail)
 - Reinsurance cover available
 - Quality of internal control systems
 - ALM issues

Having Rs 50 crores as the minimum criteria is appropriate as it will ensure that small companies have a minimum threshold free assets as they are likely to be able to cope with volatility in claims experience. Whether the Rs 50 crores is appropriate needs to be considered looking at legislation in other countries.

[18]

[Total 100 Marks]
