Institute of Actuaries of India

Subject CA1-I – Actuarial Risk Management

September 2018 Examination

INDICATIVE SOLUTION

Introduction

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

Solution 1:

- The institutional investor will need to consider how this investment will fit within the overall portfolio and achieve institutional objectives.
- Level of diversification that the investment will offer
- It should not be that Echo Ltd's major sales is in institutional investor's own country in which case there is hardly any diversification achieved in relation to exposure to different economies
- This is a luxury good, which is a cyclical market i.e. demand decreases in times of recession.
- the level of risk it is ready to afford and take given the risk appetite of the institute.
- Is the investment in overseas shares allowed?
- Need to consider the current state of both the domestic and overseas economies i.e. recession, booms etc, and expected relative future performance
- If the domestic economy shows poor prospects compared to the overseas economy it may be viewed as a good investment
- issues of language barriers, tax, timing differences, accounting differences etc., all of which lead to extra expenses.
- Exchange rate risk, political risk

[5 Marks]

Solution 2: General factors include:

- The nature term and currency liability structure
  - The liabilities are relatively short term, real (linked to medical inflation)
- and any likely changes in the short & medium term for eg., introduction of
  - New long term products
  - Fixed benefit products
- The level of free assets
- The size of the fund and whether increasing, static or decreasing
- Liquidity requirement
  - Level of new premium inflow vis-à-vis working capital requirements
- Marketability of assets
  - Depends on risk vs return trade off as less marketable assets will yield a higher return compared to more marketable asset
- Level of diversification in the portfolio
- Level of credit risk that could be considered
- Performance benchmark for various asset classes
- The stance on socially responsible investments
- Legislative guidelines

[6 Marks]

Solution 3:

i) The equity risk premium is the additional return that investors require from equity investment to compensate for the risks relative to risk-free rates of return.

Equity Risk premium key components:

1. Differences in Marketability
2. Level of uncertainty of dividend income from equity
3. Uncertainty with regard to the capital value of the equity
4. possibility of bankruptcy of company leading to loss

[3]

ii) Compared to equities, property has a number of major disadvantages:

- It is unmarketable and illiquid
- It comes in large units
- Its dealing costs and management costs are high
- There is risk of void
- There are risks of depreciation and obsolescence
- leasehold property has limited value compared to free hold.

Hence PRP generally higher than ERP to compensate for these additional risks.

[3]

[6 Marks]

Solution 4:

i) Information asymmetry is a situation where at least one party to a transaction has relevant information which the other party or parties do not have.
Hence, all parties in a transaction do not enjoy access to all information leading to sub optimal choices being made by less than perfectly informed parties leading to inefficient allocation of resources.

[2]

ii)

a) Example of a general insurance contract:
An insurability option where an individual can automatically renew car insurance policy even if the normal driver has changed
The information asymmetry is that the car owner knows that the driver is different but insurance company is charging flat/same premium. Even if the new driver is more accident prone/risky or having poor accident records then insurance company ends up under-pricing of risks by charging same premium. [2]

b) Example of a life insurance contract:
An insurability option where an individual can increase the level of life cover without supplying medical evidence.
The information asymmetry is that the policyholder knows their state of health but the insurer does not if there is no medical underwriting. A policyholder will be more likely to exercise the option if they are in ill-health and ineligible/charged a higher premium for a new policy with full underwriting. [2]

iii) Mitigation tools include:

– service provider to disclose full information about its products and services in plain and simple language

– chinese walls- Knowledge held by a service provider about third parties can be restricted for eg. by insider-trading regulations and or by having as Chinese walls or separation of functions between different organisations.

– cooling off periods- as giving them the right to terminate the sales process at any time, or by providing a "cooling off" period, during which a consumer can cancel a contract with no penalty.

– customer legislation on unfair contract terms and Treating Customers Fairly(TCF)- legislation or regulation to ensure that providers of financial products run their businesses in the interests of their customers.

– "whistle blowing" if providers do not meet their responsibilities for eg., actuary to a pension scheme if they believe the trustees is treating members unfairly

[4]

[10 Marks]

Solution 5:

i)

a) Data entry, policy printing and despatch of documents

- Stealing and abuse of critical customer data
- Fraud/collusion among employees of vendor leading to financial loss
- Errors in data entry leading to…..
  - Errors in financial accounting, reserving, MIS
- Delay in despatch of documents leading to regulatory penalties
- Reputational risk from lack of QC
  - Customer dissatisfaction leading to loss of sales, renewals
- Distribution dissatisfaction with errors/delay in delivery –risk they take their business elsewhere
- Vendor business interrupted due to natural or other perils
- Vendor insolvency

b) Actuarial consultant

- Data security issues
- Lack of internal controls and QC at external consultant's level
- Errors, omissions by external consultant leading to regulatory issues and penalties
- Delay in deliverables leading to issues in financial reporting/regulatory reporting
- Disputes and un-reconcilable differences between management and external consultant
- Consulting services interrupted due to consultant abrupt winding up of business due to ill health/death

[6]

ii) Mitigation

- Thorough scrutiny and due diligence of third party vendor [2]–

  - credentials
  - financials
  - experience record
  - testimonials
  - key management personnel
- Service level agreement [2]
  - TAT for various activities
  - Penalties for deviation from agreement
  - Discuss KPI and negotiate fee as partly variable based on certain KPIs being met
- Ensure the third party vendor has a [2]
  - sound disaster recovery plan to protect against natural perils
  - Sound IT security policy
  - Data protection policy
  - Preventive measures relating to fraud and collusion
- Conduct spot checks to ensure adherence to agreement[1/2]
- Additionally, in case of actuarial consultant –[1]
  - Firm has appropriate succession plan,
  - Appropriate management of conflicts of interest

[6]

[12 Marks]

Solution 6:

i) Characteristics

a. High risk investment- Significant uncertainty on how this new idea will pan out or will be profitable at all
b. Neither liquid not marketable
c. Inexperienced promoters
d. Investment is pretty long term as the idea has to be fully conceptualized, developed and made operational- unlikely to be any dividend pay out at all in initial years and likely need for additional capital in future[1]
e. Gains from investments -Any exit and gain from the start up will take place either through outright sale to a third party or through an IPO which could take a long time to happen[1]
f. Difficulty in valuation of such investments.

Suitability:

a. Depends on size of fund and proposed investment size relative to total size of with profit fund
b. Duration of liabilities as the investment is long term- ill-liquid and not marketable
c. Level of surplus in the par fund
d. Depends on whether such investments will meet Policyholder reasonable expectations
e. Shareholder risk appetite though could be higher compared to without profit fund

[6]

ii) Characteristics

a. It can be seen as a bond with an equity option attached
b. Features of both fixed interest and equity-Protects principal and income on the downside but allows insurer to participate in the upside should the underlying company succeed
c. It is a sunrise industry with a High risk/High reward potential
d. Private placement and medium sized company- likely limited marketability

Suitability

a. with profit fund has some guaranteed liabilities for which debt could be good match
b. Diversification from conventional debt
c. Term of the debt could be suited to term of the liabilities
d. Possibility of upside as well on conversion which can potentially increase returns to policyholders[1]
e. Limited risk especially if debt is secured and company has good credit standing- income and principal protected
f. May be suitable if there is limited free assets or if shareholders have limited risk appetite.

[6]

[12 Marks]

Solution 7:

Under Option 1:

- Risks are shared between the employee and employer but the share of risk is related to the salary level of the employee

  Investment risk:
- an employee earning less than equal to limit will bear no risk while those above the limit will bear risk on DC portion.
- The Employer bears investment risk for the entire DB portion for all employees
- Employees taking less than the salary limit take no investment risk, while high income earners take on full investment risk on the DC portion
- Longevity risk:
  - The employer bears longevity risk for all the DB portion;
  - Employers risk of additional longevity risk that may all be passed to them if the DC benefit is annuitized
  - Only high-income earners need to take on their longevity risk if they choose to cash out their DC portion
- Pre-retirement inflation risk is taken on by the employee since the salary limit on which DB is promised is not index linked
- Employer has stable contributions for DC portion, but is still subject to the risk of volatility in contributions for the DB portion. (incl. asset liability mismatch)

Under Option 2:

- Risks are shared between the employee and employer.
- Risks of contribution variability from the employer are eliminated.
  Investment risk
- Employers take on the investment risk but will have the opportunity to pass some of this risk to employees since if markets are not favorable the benefit may decrease.
- **Longevity risk**
- Employers take on the longevity of benefit payout
- Significant longevity changes may be passed to the employee by way of benefit decreases
- **Inflation risk-** Pre-and post-retirement inflation risk is shared since benefits may be decreased.
- Expense risk- Expenses risk is shared as benefits may be decreased
- Employees bear a risk that their retirement income may be volatile if benefits can change for retirees / standard of living may change
- Employees face the risk that employers have limited incentive to manage the scheme risks to minimize risks of underfunding

[15 Marks]

Solution 8:

i) Advantages to the customers investing in this product:

- Expert Advice: Since the product is designed by professionals, hence their expert advice will be beneficial to identify high return residential properties to invest in.
- Size: Many properties are too big to invest even for HNI customers who seem to be target for the scheme. By this product, exposure can be obtained for very large property constructions
- Diversification: Wider diversification can be achieved while investing in this product. Example: a single investor can invest in 4-5 different residential properties with an investment of Rs 100Mn. With this property fund and same outlay of investment a greater diversification can be obtained.
- Buy back option: The product offers buy back option after 3 years. Hence, this provides liquidity for investors in case investors want to exit/reduce exposure to property market.
- Costs minimized- costs of direct property investment are higher compared to mutual fund management expenses due to scale that can be achieved by the fund

Disadvantage:

- The property fund will invest in property companies involved in residential property and hence diversification in the portfolio is limited. Economic down turn usually impacts all residential properties adversely and take similar time to recover. Hence diversity is limited
- Maximum investment capped at Rs 100 Mn for investor which might be a hindrance for some HNI customers especially if there are more attractive alternatives
- Charges of mutual fund will reduce returns and hence why not invest in property companies directly
- Lock in period of 3 years which means investors cannot exit even if performance is poor or alternatives are more attractive [6]

ii) Main risks that mutual fund face and their mitigations:

S.No.	Risks	Mitigation
1	FPO under subscribed -Awareness of this product is less especially among HNI customers. Hence, number of customers buying this product is less than expected.	Advertising directed at the target market which could be banks and their HNI customer base, Consider removing cap of Rs 100 Mn on investment
2	Regulatory Risk -the regulator does not approve this product or approval gets inordinately delayed	Pro actively work with regulator to ensure less delays
3	Significant redemptions at end of 3 years forcing liquidation of assets	Put limits on redemption at any time. Or allow staggering of redemption payments over a period of time to ensure no forced sale
4	Reputational and financial risk exist if the product is a failure	Deep brainstorming Compare other similar products available in the domestic as well overseas market
5	Investments are exposed to catastrophe risks	Ensure that properties companies have appropriate insurance against natural perils, business interruption etc
6	Fund performance poor relative to peers	Regular monitoring of investments, fund performance and setting fund manager compensation relative to performance.
7	Lack of experiences staff/fund managers	Ensure appropriate manpower is in place as well as succession planning
8	Inadequate charges	Analyse: Fund manager costs, Regulatory cost, advertisement, infrastructure cost, auditor, customer call centre etc Charges need to be adequate but at the same time competitive
9	Valuation: Property companies could be listed/unlisted and there could be difficulties in valuation	Have clear policy on valuation of listed/unlisted securities which is well communicated as well
10	lack of clarity in investment objectives of fund leading to dissatisfaction among investors	Prepare appropriate guidelines/ strategy and communicate same to customers at time of investment as well as on continuous basis
11	Failure/Insolvency of property companies	Financial due diligence before investing , rating of companies/projects

12	Residential projects do not perform to expectations or delayed- limited sales, issues in completion	Invest only in projects having the highest rating and promoted by known and reputed developers

[10]

[16 Marks]

Solution 9:

i)

1. The with profit contracts have limited down side(due to guarantees on sum assured and vested bonuses) but have considerable upside from future bonuses. Hence there is an embedded guarantee in such contracts making it necessary to estimate the COG.
2. Usually, the investment return assumptions in a deterministic model are based on estimates of the expected return from each asset class.
3. This fails to take into account the variability of asset returns and
4. the correlations between investment returns on different asset classes and between the assets and liabilities.
5. This is a problem because it is difficult to test whether the nature of the assets (ie fixed, real or varying in some other way) is suitable to match the with profit liabilities.
6. even in a deterministic model , a number different scenarios (eg low inflation, high inflation, low lapse, high lapse etc). have to be considered
7. With a deterministic model, a problem will only be identified if the relevant scenario is actually modelled.
8. Scenario setting is, however, highly subjective.
9. If there is a lot of variability in the parameters, even scenario testing may not identify the true extent of the risk of insolvency.

A stochastic model is really needed- as it can address all short comings mentioned above [5]

ii)

Factors:

1. Profile of the liabilities – there is a fundamental requirement that the investments offered are a suitable match for the liabilities in terms of nature, term and currency.
2. Equity is a risky asset which offers higher returns but returns are very volatile increasing uncertainty of future portfolio returns and hence future bonuses.
3. PRE as regards stability of reversionary bonus and volatility of terminal bonuses.
4. What is the potential upside from increasing risk
    a. Increased returns to customers and hence higher satisfaction
    b. Higher existing customer retention and new business
    c. Bring portfolio at par with competition /more aggressive than competition
5. Can down side of equity risk be hedged and the costs associated with hedging
6. Maturity of the portfolio- for instance higher guarantees embedded in existing business and limited ability to offset future equity losses against future bonuses[1]
7. The level of uncertainty of the existing liabilities (both in amount and timing) and hence the need for liquidity/marketability must be studied before taking any decision.

8. Further, risk appetite of the Company should be considered.
9. The level of free assets in the with profit fund and Company is also considered which indicate the amount of risk the fund/Company can take.
10. If the amount of free assets is significant then the Company may think of increasing equity exposure.
11. Consider statutory, legal or voluntary restrictions on how the fund may invest
12. Profile of target market – consider the financial sophistication of the company's customers in understanding the impact of new investment strategy [1]
13. Competition – consider the comparable investment options offered by competitors.
14. Consider tax treatment of equity as an asset class
15. Consider limits on admissibility of equity investments in calculation of solvency margin or from
16. Higher Capital charge on equity investments compared to other investments leading to higher capital requirement
17. Treatment of un-realised gains in financial statements and its likely P and L volatility, for eg. are equity investments to be valued at lower of BV/MV while liabilities will continue to be valued on BV basis [1]
18. The availability of fund managers with expertise in equity management.
19. Increase in expenses from increased equity exposure-new man power other infrastructure required and its impact on net returns
20. How will change be communicated positively to target market and existing customers
21. Training to sales force on how this change should be communicated to existing customers and new customers.

- Liability hedging is where the assets are chosen in such a way as to perform in the same way as the liabilities.

  The major challenges are:

  1. The appropriate and suitable instruments are not available in the market.
  2. The returns offered for hedging liability is very low.
  3. Hedging also reduces the returns to the life insurance company because the life insurance company transfer part of their profits to the other party.
  4. Default risk associated with the other party. [13]

[18 Marks]

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