

Institute of Actuaries of India

Subject SA5 – Finance

September 2016 Examination

INDICATIVE SOLUTION

INTRODUCTION:

The indicative solutions provided are very detailed in nature for the benefit of students and the examiners are not expecting the students to provide such in-depth details under examination conditions. However the students are expected to cover all the fundamental principles to demonstrate their understanding of the subject.

Solution 1:

- i) The complexities of the current regulatory environment undoubtedly pose significant challenges for all the insurance companies, as regulators continue to expect management to demonstrate robust oversight, needs based selling compliance, and risk management standards. Some of the challenges that regulators face are as follows :
- a) **Strengthening Governance and Culture** -Despite heightened attention from regulators and organizations to strengthen governance structures and risk controls frameworks, instances of misconduct (i.e., professional misbehavior, ethical lapses, and compliance failures) continue to be reported across the financial services industry, including the insurance sector. Boards and senior management are now expected to define and champion the desired culture within their organizations; establish values, goals, expectations, and incentives for employee behavior consistent with that culture; demonstrate that employees understand and abide by the risk management framework; and set a “tone from the top” through their own words and actions.
 - b) **Improving Data Quality for Risk Data Aggregation and Risk Reporting**- Financial institutions continue to struggle with improving their risk data aggregation, systems, and reporting capabilities and insurers, in particular, will be challenged to handle upcoming changes in regulatory reporting, new accounting pronouncements, enhanced market opportunities, and increasing sources of competition due to legacy actuarial and financial reporting systems
 - c) **Harmonizing Approaches to Cybersecurity and Consumer Data Privacy** - Failures in cybersecurity have the potential to impact operations, core processes, and reputations, but, in the extreme, can undermine the public’s confidence in the financial services industry as a whole. Financial entities are increasingly dependent on information technology and telecommunications to deliver services to their customers, both individuals and businesses, which, as evidenced by recently publicized cyber hacking incidences, can place customer-specific information at risk of exposure. Some firms are responding to this linkage between cybersecurity and privacy by harmonizing the approach to incidence response and most have made protecting the security and confidentiality of customer information and records a business and supervisory priority for this year
 - d) **Recognizing the Focus on Consumer Protection** – There has been instances in the past where products has been pushed to consumers without properly understanding his needs and affordability.
 - e) **Addressing Pressures from Innovators and New Market Entrants** - The financial services industry, including the insurance sector, is experiencing increased activity stemming, in large part, from the availability of new products and services being introduced to meet the growing demand for efficiency, access, and speed. Broadly captioned as Financial Technology, or FinTech, innovations such as Internet-only financial service companies, virtual currencies, mobile payments, crowdfunding, and peer-to-peer lending are changing traditional banking and investment management roles and practices as well as risk exposures.
 - f) **Transforming the Effectiveness and Sustainability of Compliance** - Compliance continues to be a top concern for financial institutions and insurance companies as the pace and complexity of regulatory change, coupled with increased regulatory scrutiny and enforcement activity, have pushed concerns about reputation risk to new levels. These firms need to be able to respond to changes in their internal and external environments with flexibility and speed in order to limit the impacts from potentially costly business shifts or compliance failures

- g) Managing Challenges in Surveillance, Reporting, Data, and Control - it will be essential for financial institutions and insurance companies to reassess the strength and comprehensiveness of their compliance risk management programs in order to better manage and mitigate both known and emerging regulatory and legal risks and proactively respond to prospective market structure reforms.

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ii) S Life would have considered following points before the merger :

- a. The merger is a horizontal merger as it involves companies that operate at the same stage of the production process.
- b. to benefit from economies of scale, particularly using one set of head office staff in the India rather than two, or a single branch network
- c. to benefit from complementary resources, such as fund managers' expertise or utilising the tied selling agents of both companies or complementary client bases
- d. to eliminate inefficiencies – *i.e.* underperforming management and branches
- e. to benefit from opportunities that might only be available to larger companies – for example entering a new competitive market in the savings industry which might require more time and resources than any one of the two companies possesses. This may be minor as G Life is small in comparison with S Life.
- f. utilization of unused tax benefits – if two proprietary life companies have different tax positions, then one may take over the other in order to make sure that any valuable unused tax shields will definitely be used
- g. utilization of surplus funds – for example, if a company has surplus funds or estate and the other has solvency difficulties, then a merger might allow both companies to continue trading (it could also be that S Life has a cash pile which it would like rid of, and by making the acquisition for cash, the company effectively gets rid of the cash pile)
- h. protection against threat of takeover – by increasing the size (albeit modestly) of the business [½]
- i. Enhancement of earnings per share – S Life may be able to increase its earnings per share by taking over G Life, which may have a lower price earnings ratio. The earnings per share of the merged company will increase if the merger reduces the total number of shares in existence without affecting total earnings.
- j. Exploitation of lower financing costs – often large companies are able to raise debt or equity at higher prices. Again this is likely to be of minor significance in this case.
- k. competition and anti-monopoly (*anti-trust*) legislation – this may be a concern if the merger involves the creation of a company with significant market share in the unit-linked savings market
- l. the form of the transaction (merger, purchase of control or acquisition of some part of the target's operations) – which may influence whether the acquisition itself is non-taxable or taxable
- m. the treatment of goodwill in the consolidated balance sheet

[6]

iii) The financial reporter statement has merit in his statement because of the following reasons especially in a shrinking market or where the company is struggling to show growth to shareholders :

1. There is often a conflict of interests between the managers of the firm (who want to retain cash/profits to maintain the size of the firm), and shareholders who want surplus cash returned to them.
2. Managers' remuneration is often linked to the size of the company rather than the profitability, hence managers will generally not want the company to reduce size

3. managers will be tempted to invest in such projects to keep the company large, rather than return cash to shareholders
4. There is a tendency in shrinking industries to waste resources on internal operating inefficiencies such as internal projects, new computer systems, *etc.*, when these are not really required.
5. In addition there is a tax benefit to a profitable company in having a large proportion of debt in the finance package.

However, we need to note the following points for seeing his statement in full light:

1. If the company is highly debt financed, then most of the spare cash flow is used up in servicing the debt, imposing a discipline on the management of the company.
2. Companies with high debt proportions have high fixed costs. When profits are volatile this can push the company into financial distress (having too little cash resources to run the day-to-day functions of the company).
3. In addition, variability in corporate earnings can affect a firm's ability to take full advantage of tax credits and write-offs, thus removing one of the main advantages of debt over equity.

[6]

iv) The factors that I will consider on behalf of regulator are as follows :

- a. competition and anti-monopoly (*anti-trust*) legislation – this may be a concern if the merger involves the creation of a company with significant market share in the unit-linked savings market and other products
- b. after the change of control, the domestic insurer would be able to satisfy the requirements for the issuance of a license to write the line or lines for which it is presently licensed;
- c. the financial condition of the acquiring party might not jeopardize the financial stability of the insurer or prejudice the interests of its policyholders;
- d. the plans or proposals that the acquiring party has for the domestic insurer (e.g., to liquidate the insurer, sell its assets, consolidate or merge it with any person, or make any other material change in its business or corporate structure or management) are fair and reasonable to the insurer's policyholders and in the public interest;
- e. the competence, experience, and integrity of those people who would control the insurer's operation would be in the interest of the insurer's policyholders and of the public; and
- f. the acquisition is not likely to be hazardous or prejudicial to those buying insurance
- g. If it is listed company it complies with the rules set up by SEBI and other relevant parties

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v) Internal Capital Model: Concept and Applications

- i. The internal capital models are developed by the management of a company to help assess the capital needs of their company. The internal capital model allows for the specific circumstances of the company concerned and the risk profile of the company. Hence the internal capital model should be more accurate and useful in any decision making process.
- ii. Internal Capital models can be used for decision making in a wide range of areas such as:
 - Setting the strategic investment (strategic asset allocation) strategy
 - Placing a value on any business being bought or sold

- Analysing the impact of any mergers/acquisitions or sales/disinvestments on the risk profile and capital requirements of the company
- Investigating the impact of an “extreme event”
- Allocating capital across different business lines
- Measuring the Risk Adjusted Return on Capital (RARoC)
- Developing an optimal product mix
- Evaluating the cost effectiveness of reinsurance arrangements
- Setting appropriate premiums for products
- Setting risk limits
- Meeting solvency capital requirements
- Incentivising management as a part of a targeted management incentive program

[6]

vi) Criteria Applied by the Regulator for Approving an Internal Model:

- i. Use Test: The company must demonstrate that the internal model plays a significant role in the internal governance, risk management and decision – making processes as well as the economic and solvency capital assessments and capital allocation processes
- ii. Statistical Quality Standards: The model must meet minimum quality standards related to
 - Assumptions and data
 - Probability distribution forecasting
 - Use of expert judgement
 - Materiality considerations
 - Methods of aggregation
- iii. Calibration Standards: These standards aim to assess whether the capital requirement derived from the internal model has a calibration equivalent to, say, 99.5% VaR over one year
- iv. Profit and Loss Attribution: The company must demonstrate how the categorisation of risk in the internal model can be used to explain the causes and sources of actual profits and losses
- v. Validation Standards: The internal model must be fully validated by the company. It must be subjected to regular control cycle review including testing results against emerging experience

- vi. Documentation: The design and the operational aspects of the internal model must be clearly and thoroughly documented.

[5]

vii) Possible reasons for divergence between market cap and EV are as follows :

- a. Cost of acquisition has been greater than what they had initially expected and market has reacted negatively and feel that the benefit of synergies will not reflect in results as originally expected
- b. Market feel that operational issues will continue longer than assumed
- c. Market has lost faith in management and feel they may not be able to deliver on promise
- d. Market sentiment is negative for the sector and entire sector is trading at a discount to EV
- e. Pension deficit and other cost has not been factored(or partially factored) in EV
- f. Company is using traditional embedded value metrics which does not reflect market reality
- g. Market is expecting persistency to fall hence leading to increased surrenders

[5]

[43 Marks]

Solution 2:

i) a)

Key Economic Variables Impacting Demand for Consumer Credit

- i. Level of Interest Rates: A fall in the short term rates of interest encourages people to borrow and buy. Therefore the demand for consumer credit is likely to increase
- ii. Level of Employment: When the unemployment rate falls and people feel more secure in their jobs, they tend to invest in white goods and new cars often funding these investments using consumer credit
- iii. Reserve Ratios and Mandated Lending Requirements: When RBI increases the reserve ratios [like the CRR (cash Reserve Ratio) and SLR [Statutory Liquidity Ratio]], there will be less liquidity in the banking system resulting in reduced consumer lending. Likewise if RBI increases the mandated lending requirements (e.g.: lending to priority sector) consumer lending is likely to shrink. The opposite effects will occur if RBI lowers the reserve ratios and/or the mandated lending requirements.
- iv. Given the risk based capital requirements stipulated by the Basel Accords, banks may be compelled to reduce the volume of risky assets in their balance sheets. Under such circumstances banks will not be keen to expand their balance sheets through consumer lending

[5]

b)

Key Challenges faced by RBI in Implementing Monetary Policy:

1. The monetary policy needs to be aligned with RBI's mandate to deliver price stability. The current mandate for price stability includes a formal inflation target – the consumer price inflation needs to be held at 4% plus or minus 2% for the financial year through March 2017 and all subsequent years.

2. Supply side shocks tend to be more prevalent than demand side shocks in the Indian context which makes the monetary policy less effective in managing inflation. This increases the risk of missing the inflation target which can damage the central bank's credibility
3. The other main challenge is to calibrate the monetary policy to support growth without triggering inflation. Loosening the monetary policy to revive weak growth will exacerbate inflationary pressures. On the other hand, tightening the monetary policy to dampen inflationary conditions can slow down growth. The current scenario where global economic recovery is fragile and Indian economy being vulnerable to drought conditions [caused by weak monsoon], heightens the monetary policy challenges

[4]

ii) a)

Plausible Reasons for Leasing:

- i. **Standardisation:** As the leasing company like NFSL is likely to be entering into similar arrangements with a large number of firms, the economics of scale can reduce administration and transaction costs. Hence leasing can turn out to be a cheaper source of financing (than other forms of financing) for small and medium sized companies
- ii. **Fewer Restrictive Covenants:** Long term loans can have several restrictive covenants related to matters like new investments, additional financing, managerial appointments, dividend payment and provision of guarantees. By comparison, lease contracts contain fewer and less restrictive covenants
- iii. **Use of Tax Shields:** The leasing company (NFSL) may be able to make better use of the tax allowances (e.g.: depreciation tax shield) available to the owner of the equipment (medium sized manufacturing company in this case) If the lessee is making losses, it may not be able to avail the tax allowances. The leasing company can avail of these tax allowance and share a part of this benefit with the lessee by charging lower lease rentals.
- iv. **Option to Cancel:** If the lease terms provides an option to cancel the lease, this flexibility might prove to be valuable to the manufacturing company if events do not go as planned. It also means that the risk of obsolescence is borne by the lessor.
- v. **Matching of Lease Rentals to Cash Flow Capabilities:** The pattern of debt servicing burden for the term loans is more or less uniform for all types of borrowers. As against this, a leasing company like NFSL often tailor lease rentals to match the cash flow capability of the lessee e.g.: seasonal, stepped up and deferred.
- vi. **Maintenance:** The lease may include maintenance and servicing which might save time and money for the lessee.
- vii. **Alternative Sources of Finance Available for Other Needs:** If the manufacturing company leases the equipment, it can use its other sources of finance for other needs of the business.
- viii. **Full Financing:** Leasing effectively provides 100% financing because the leasing company pays the entire cost of the leased equipment other forms of financing may only finance a

proportion of the cost and require the manufacturing company to finance the remainder. The company may find it difficult to finance the margin money commitment.

[6]

b)

i. Equated annual lease rental

$$= 300/a(20\%, 5 \text{ years})$$

$$= 300/2.991$$

$$= \text{Rs. } 100.30 \text{ lakhs}$$

ii. Let y be the lease rental in Year 1.

Then the equation of value is:

$$Yv + y*(1.15)*v^2 + y*(1.15)^2*v^3 + y*(1.15)^3*v^4 + y*(1.15)^4*v^5$$

$$= 300$$

i.e., y- Rs. 78.29 lakhs where v is calculated using the pre-tax return of 20%pa.

The lease rentals (year wise) will be as follows:

Year	Lease Rental (rs. Lakhs)
1	78.29
2	90.03
3	103.54
4	119.07
5	136.93

iii. Let L be the annual lease rental payable between years 3 to 5.

$$\text{Then } L*a(20\%, 3 \text{ years})*v^2 = 300$$

$$2.106*0.694*L = 300$$

$$L = \text{Rs. } 205.26 \text{ lakhs}$$

[3]

c)

Accounting for Financial Lease

A finance lease results in a substantial transfer of the risks and rewards of ownership from the lessor to the lessee. Usually, a financial lease is a medium to long term (e.g.: 3 to 7 years) non-cancellable lease

Hence from the standpoint of the lessee, a financial lease

- Creates an obligation to pay rentals over a period of time in the future which is very similar to the repayment obligations on a long- term loan
- Allows the lessee to use the asset over its economic life

Therefore a financial lease cannot be treated as an off balance sheet transaction in the books of the lessee. If a financial lease is treated as an off balance sheet transaction in the books of the lessee (creative accounting), then it provides a misleading view of the debt capacity of the lessee (debt capacity is overstated) and the efficiency of asset utilisation (asset turnover ratio is overstated)

The appropriate accounting treatment is to capitalise the financial lease in the books of the lessee

This means that:

- a) At the inception of the lease transaction, the leased equipment is shown as an asset in the balance sheet matched by a liability shown in the balance sheet called "lease payable". The value of the asset and the liability is equated to the present value of the committed lease rentals.
- b) Each lease rental payment is split into two parts -finance charge and principal amount. The finance charge is expensed to the profit and loss account and the principal amount is deducted from the liability "lease payable".
- c) The leased asset is depreciated in the books of the lessee as per its depreciation policy

[5]

d)

Approaches for Assessing Default Risk

1. A broad assessment of the default risk can be obtained by considering a rating agency's assessment of the client's (lessee) outstanding bonds or how the yield on such bonds compares with those of similar companies. Consideration of share price movements can also be informative. For example, if the bonds of a prospective lessee company have just been downgraded by the credit rating agencies and its share price has been falling, then NFSL needs to be concerned about the enhanced credit risk of the lessee

2. For screening applicants for consumer credit (Retail Finance Division), NFSL can use some form of credit scoring. If NFSL can develop an effective credit scoring algorithm, then it can have a significant competitive advantage because it will be a closely guarded proprietary scoring system.

An example of this approach is the Altman's Z score which is expressed as

$$Z = (3.3 * \text{EBIT}/\text{TA}) + (\text{NS}/\text{TA}) \\ + (1.4 * \text{RE}/\text{TA}) + (1.2 * \text{WC}/\text{TA}) \\ + (0.6 * \text{MVE}/\text{BV}(\text{D}))$$

Where EBIT = Earnings before Interest and Taxes

TA = Total Assets

RE = Retained Earnings

WC = Working Capital

NS = Net Sales

MV (E) = Market Value of Equity

BV (D) = Book Value of Debt

3. Financial Statements Analysis: This approach can be used by the Corporate Finance Division to get a broad assessment of the credit risk for those customers for whom published credit ratings are not available. The typical financial ratios considered for assessing credit risk are

- Current Ratio = Current Assets/ Current Liabilities

(ideally the current ratio needs to be 2:1)

- Liquidity Ratio = Liquid Assets/Current Liabilities

where Liquid Assets = Current Assets – Inventory (Ideally the liquidity ratio needs to be 1:1)

- Debt to Equity Ratio = Total Debt/Net Worth

- Interest Coverage Ratio = PBIT/I

where PBIT = Profit before Interest and Taxes

I = Annual Interest Commitment

4. Structural Credit Risk Models: The Merton Model is an example of this type of credit risk model. The Merton model can be used for calculating the probability of default based on the level of debt in the capital structure of the company, the current share price and the potential volatility of the share price movements.

This approach can be used by the Corporate Finance Division of NFSL to evaluate the credit risk of corporate customers whose shares are listed and traded on stock exchanges.

5. Reduced Form Models: These models are different from the structural credit risk models in the sense that they by-pass issues related to valuation of individual firms and work directly with equity and bond market information. They model default risk from what is implied in market prices of bonds, credit spreads and rating transitions. Developing and using these models for assessing credit risk require a fairly high degree of quantitative modelling skills.

[10]

e)

Estimating Economic Capital Using the “Earnings at Risk”(EAR) Approach:

- i. This approach equates economic capital to the level of capital required to ensure that the risk free earnings on that capital offsets an appropriate degree of earnings volatility. The degree of volatility is usually expressed as a multiple of the standard deviation of the distribution of net profits.
- ii. Therefore the first step in this process is to construct a financial model for net profits. A simplified example of the model output is provided in the following table. Here, we have assumed that the gross annual revenue of the company is normally distributed with a mean of Rs. 10,000 million and a standard deviation of Rs. 1,000 million. Fixed costs are assumed to be Rs. 4,000 million per annum and variable costs are taken as 5% of the gross annual revenue. The corporate tax rate is assumed to be 20%. The risk free rate of return is take as 6% pa.

Divergence from mean (standard deviation)	-2	-1	0	1	2
Revenue	8,000	9,000	10,000	11,000	12,000
Variable Costs	400	450	500	550	600
Fixed Costs	4,000	4,000	4,000	4,000	4,000
Profit before Tax	3,600	4,550	5,500	6,450	7,400
Tax	720	910	1,100	1,290	1,480
Profit after Tax	2,880	3,640	4,400	5,160	5,920

- iii. The second step is to determine the earnings at risk (EAR). This involves defining the confidence coefficient (e.g.; 99%) which is required to calculate the EAR. For example if the confidence coefficient is 99% then the EAR will be equal to $[(5,920-2,880)/4]*2.57$

= Rs. 1,953 million

- iv. The third step is to calculate the economic capital or the level of risk capital – the capital required to ensure that the specified level of profit volatility is offset by the risk free earnings. In our example, this will be:

EAR divided by the risk free rate which is equal to $1,953/0.06 = Rs. 32,550$ million

[8]

f)

Marginal Earnings at Risk Approach:

- To calculate the marginal EAR for each line of business, we need to first calculate the EAR for the company (NFSL) as a whole. As the next step we need to calculate the EAR for the whole company but excluding each division in turn. The marginal EAR is the difference between the EAR of the whole company and the EAR of the whole company excluding the division concerned.
- To calculate the marginal earnings at risk in this case we need the following additional information:
 - i. Standard deviation of the annual net profits of Corporate Finance Division and Retail Finance Division (excluding Retail Investment Advisory Services Division)
 - ii. Standard deviation of the annual net profits of the Retail finance Division and Retail Investment Advisory Services Division (excluding Corporate Finance Division)
 - iii. Standard deviation of the annual net profits of the Corporate Finance Division and Retail Investment Advisory Services Division (excluding Retail Finance Division)

[3]

g)

Benefits and Drawbacks of Allocating Capital Using the EAR Approach:

- The primary advantage of this approach is that, other things being equal, that division whose profits are not correlated to other business (other divisions) will receive a relatively low capital allocation. Hence this approach recognises the diversification benefit provided by a particular division to the company as a whole
- However in practice, the marginal EAR approach is used mainly for marginal decisions such as whether or not to enter/exit a particular business or project. The diversified EAR approach is more commonly used for capital allocation across divisions because the diversified EAR correctly represents the level of risk that each division represent as a part of the whole company.
- The diversified EAR for each division is calculated by (i) estimating the undiversified EAR for that division, (ii) calculating the correlation coefficient of that business's earnings with that of the company as a whole and (iii) multiplying the undiversified EAR by the correlation coefficient

The other limitations of the Marginal EAR approach are:

- If changes occur within the businesses of the three divisions, the standard deviation of the profits of each pair of divisions can change.
- Given the uncertainty component of risk, it is rarely possible to verify whether the risk based capital allocation is appropriate regardless of the approach used for this purpose

- The capital calculations can be only as accurate as the risk assessment. In practice, a great deal of judgement is exercised in carrying out a risk assessment and the results may reflect subjective views.
- The marginal EAR approach can result in different capital allocations depending on the order this analysis is done – which two out of the three divisions is selected first for calculating the capital requirement

[6]

h)

Interest Only Bonds

- i. This tranche can carry a significant level of interest rate risk if the financial lease contracts allow prepayment of the future lease rentals.
- ii. Investors expect to receive a steady interest income from the lease portfolio until all lease contracts redeem, which can be 10 to 12 years in the future.
- iii. If the lease contracts allow prepayment, then the capital is repaid and interest income terminates early, say after two to three years after purchasing these bonds.
- iv. Prepayment can occur under any of the following circumstances:
 - Fall in interest rates
 - More leasing companies entering the market with competitive products
 - Poor servicing by the leasing company (NFSL) prompting the lessees to pre pay
 - Investors buying this tranche anticipate pre -payment to be less than what has been allowed for while pricing these bonds. Typically they expect the market rates of interest to increase over the remaining lease period.

Principal only Bonds

- i. The investors buying these bonds will receive the capital component of each lease rental over the remaining lease term.
- ii. However if the finance lease contracts allow pre- payment and the lessees prepay these bonds will be redeemed earlier than expected.
- iii. Investors buying these bonds anticipate to pre payments to be higher than what was expected at the time of issuing the bonds. These investors expect the interest rates to fall over the remaining lease period.

[7]

[57 Marks]
