

Institute of Actuaries of India

Subject SA5 – Finance

March 2018 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)

1. High interest rates may delay investment decisions leading to lower economic activity
2. Lesser number of fresh jobs created which may result in increased unemployment rate
3. In high interest rate regimes, generally the inflation may also be high thus making cost of living higher for the poorer sections of the economy
4. The government may have to dole out more subsidies due to lesser employment through various employment generation programs
5. The market value of assets will be lower and banks and other financial institutions may have to find additional capital to meet its liabilities unless the liabilities are also marked to market. If the assets are marked to market, ALM will be key
6. Companies may have to pay higher interest charges thus putting pressure on costs which may lead to lower than expected wage increases. When lower wages are coupled with higher inflation, it would lead to lower spending thus may in the long run put the economy on downward spiral
7. Banks will be forced to increase the interest rates on the deposits and may see good flow of money and if there are no corresponding asset deployments like lending activities, Bank's margins would be eroded and may lead to lower profits
8. Higher interest rates may lead to NPAs especially from small & medium industries
9. Many investors may look at fixed income securities as more attractive and stock markets may not attract equity capital
10. If the government is running a large fiscal deficit, higher interest rates may increase its cost of borrowing especially and is detrimental to economy if the borrowing is to fund its revenue expenditure and support subsidies rather than for investments.
11. Higher interest rates may attract more foreign capital especially if the other markets have a very low interest rate regime
12. Higher forex reserves may on one hand improve the exchange rate but also may lead to lesser competitiveness leading to lower exports
13. If the higher interest rates are temporary in nature especially to tame inflation due to overheating of economy, it may lead to tapering of inflation in the near future
14. Pensioners and people who depend upon bank interest income may benefit in terms of higher income

[8]

ii)

a)

1. Action plan in the short, medium and long term to improve the fiscal deficit like rationalization of subsidies, controlling revenue expenditure so that its borrowing requirements would come down signaling less demand for money
2. The high interest rates generally indicate high inflation in the economy. The government has to demonstrate some concrete actions to show that the CPI and WPI are coming down
3. It has to show action plans for improving the supply side of the commodities if the inflation is fueled by the scarcity of commodities.

4. Investment plans and the action plan to improve exports/production leading to better employment opportunities
5. Plans to encourage competition in the industry and reducing any trade barriers
6. Direct & Indirect tax reforms to help simplify the tax structures
7. Concrete plans to plug leakages in the system especially of subsidies and how the government is planning that the target groups are getting the benefits
8. How the government is trying to improve the governance say by more automation etc
9. Actions on improving the quality of assets with the banks and how supportive it is in initiating actions to recover NPAs
10. Strengthening the regulatory environment and increasing transparency

[5]

b)

1. Lower interest rates would indicate a positive environment for investments in assets thus triggering more economic activity in terms of investments in new factories, increasing production etc
2. Lower interest rates will lower the interest charges and hence may improve the profits for the companies which should result in increased wages for employees and dividends for shareholders thus increasing the disposable income
3. Increased disposable income may lead to higher spending which would trigger more demand thus facilitating more investments in the production facilities
4. The market value of assets would increase
5. As investment climate improves there may be more investments in equities thus helping to get more equity capital for financing new projects
6. With low interest rates, the currency value may be either stable or depreciate which may make exports more competitive
7. For the Banks, as the assets are marked to market, the value of assets would go up and hence improve the Balance Sheet
8. As the interest rates are lower, the opportunities to lend may increase which should improve its asset base. However correspondingly as the deposit interest rates come down, there may be a dip in the deposits thus the bank may have to look at various ways of attracting deposits in order to lend
9. Given the reduction in interest rates, the chances of recovery of loans will improve thus reducing the NPAs and hence may reduce the capital requirements and provisioning

[6]

iii)**1. Regulatory Capital:****The main features are:**

- increasing minimum capital ratios
- changing the risk-weighting factors
- introducing minimum “leverage” ratios
- bail-in capital.
- Increased minimum capital ratios

1. The minimum level of Tier 1 capital is higher and now includes components that are both bank and economy dependent.
2. Under Basel III, the bank's minimum Tier 1 Capital ratio to be increased to a minimum of 6% from 4% in Basel II of which 4.5% must be CET1
3. In addition, banks have to hold capital buffers that must be met by further CET1 including countercyclical capital buffer and potentially a system risk buffer
4. The banks are expected to reach a 11% ratio by 2019

- Changes in how risk weightings are calculated for market risk

1. The changes in how the RWA is calculated have on average increased it by 23%.

- Introduction of a minimum leverage ratio:

1. The minimum leverage ratio is = Tier 1 Capital/ Total Assets including off balance sheet items.
2. The minimum ratio is proposed to be 3%
3. These proposals may increase the requirement of regulatory capital for large banks

- Bail-in capital

1. The rules require banks to have additional eligible liabilities that can be called on in a crisis. These could be used to absorb losses and be converted into equity.

2. Asset and liability management

- The new rules, setting out minimum standards, have introduced additional Requirements to protect banks against liquidity risk.

These standards involve the following new ratios:

1. Liquidity Coverage Ratio (LCR)
2. Net Stable Funding Ratio (NSFR)

Liquidity Coverage Ratio (LCR)

- One way in which banks can protect themselves from liquidity risk is by holding highly liquid assets that they can sell quickly to raise cash during a liquidity crisis. However, liquidity risk is an unavoidable risk given a Bank's business model of taking in short term money and lending it out long term.
- Thus, the LCR requires that the high-quality highly-liquid assets held must exceed the net cash outflows following a stressed 30 day period.

The LCR has two components:

1. Value of the stock of HQLA in stressed conditions

2. Total net cash outflows.

Expected cash inflows are, however, not allowed to cover more than 75% of the expected outflow. This is to ensure that the bank has to maintain a minimum “buffer” of HQLA worth 25% of the expected cash outflow at all times.

- Assets are considered to be HQLA if they can be easily and immediately converted into cash at little or no loss of value. The liquidity of an asset depends on:
 - the underlying stress scenario
 - the volume to be monetised
 - the timeframe considered.
- At least 60% of the HQLA must be cash or government securities, although the Eurozone crisis has shown that government bonds may not always be liquid.

Total net cash outflows :

1. It is defined as the total expected cash outflows minus total expected cash inflows in the specified stress scenario for the subsequent 30 calendar days. Total expected cash outflows are calculated by multiplying the outstanding balances of various categories or types of liabilities and off-balance sheet commitments by the rates at which they are expected to run off or be drawn down.
2. Total net cash outflows over the next 30 calendar days=
Total expected cash outflows - Min {total expected cash inflows; 75% × total expected cash outflows}.
3. In other words, the total expected cash inflows are limited to 75% of the expected outflows.

Net Stable Funding Ratio (NSFR):

1. The NSFR requires that long-term financial resources exceed long-term commitments, where long term means more than one year. Again, this is pragmatic as wholesale market funding for over a year is seen as “sticky” and high quality. Even though retail deposits such as savings account balances or current account balances are often contractually very short-term, these balances have been seen to be long term in practice and hence get 90% weighting.
2. The objective is to encourage banks to match long term lending with what is perceived to be “sticky” longer-term funding. The definitions are very severe for
3. the corporate sector.

The bank would like to adopt Basel III for the possible reasons:

1. To comply with the regulatory directives of the central bank
2. To align with international standards to demonstrate its capital position
3. It would be easier to raise capital both domestically and internationally when the bank aligns with international standards

4. It may give an opportunity to the bank to review thoroughly its operations and strengthen its internal corporate governance and control environment

[8]

iv)

1. One of the key measures would be to improve its capital position as strong capital position would lead to a better rating
2. Review its control, compliance & audit mechanisms and address any gaps if identified as strong risk management processes would improve the rating
3. Operational processes, strengthening the documentation
4. Reviewing the asset quality and measures to reduce NPAs and improve asset quality
5. More transparent disclosures and governance
6. Additional measures taken to improve the profits and its quality
7. Actions to improve the sustainability of the income such as fee/ advisory incomes
8. Review the quality of management
9. Board management area and corporate governance
10. Improving the quality of business plans and ability to meet the business plans

Advantages:

1. Increased confidence of the investors which may help the bank to attract capital on favorable terms
2. May lead to growth in overall business as well as quality as higher rating may attract more quality customers
3. Stock price may improve as improved rating is an indication of better business performance
4. Easier to expand the business both domestically as well as overseas
5. Overall cost of borrowing may reduce as it can pay much finer rates to the deposits given the perceived higher safety thus improving its interest margins between lending and borrowing

Disadvantages:

1. More capital may be required to maintain the rating which has its costs especially bank may have to have more tie1capital
2. Cost of regulatory compliances may increase

[7]

v)

1. To offload part of its equity to the foreign partner if the foreign partner is willing to increase its stake. If the foreign partner increases the stake, it may be a demonstration of financial and business strength of the company
2. The bank may look for strategic or institutional investors who can wish to take a stake
3. Listing on the stock market thru offer for sale route and offering the shares to public

[3]

vi)

1. The initial offer price might have been higher than what the fundamentals might indicate
2. The general economic and business environment might not have been very conducive either due to slowing down of economy or any international events which might have an impact on the business
3. Any regulatory restrictions/directives which might have a specific impact on the insurance industry business itself which could increase the cost of compliance
4. There could be any adverse regulatory findings or strictures for the company which could have led to a fall in the price
5. The market share and profits might not have been in line with the expectation of the investors
6. The margins might have reduced due to higher than expected expenses or lower than expected sales

Key measures the company take to improve the share price:

1. Review its business plans and take corrective steps to improve the business performance
2. Relook at the distribution strategy and rationalize the distribution costs as it is one of the significant costs for any insurance company
3. Explore the possibility of enhancing sales thru its parent distribution channels which would reduce its costs thus improving the margins
4. Relook at the product strategy and focus on products that have higher margins without sacrificing the customer interests
5. Focussing on customer needs and designing products that are in alignments with those needs. Even if the margins may not be high for such products, if the products meet the needs of customers, it should improve the volumes and thus improving the profits in absolute amounts
6. Look at its persistency and mortality experience and take adequate measures to improve the persistency as the in-force business will yield more profits and EV than the new business as the acquisition expenses have already been incurred and hence the realization of value would be higher
7. Conduct investor meets especially for the large key institutional investors and explain what measures the management is taking to improve the profitability
8. A sustainable improvement of profits over the next few quarters will increase the confidence of the investors
9. If the decline in price is largely due to not so conducive general economic environment, explain to investors what measures the company is taking to overcome such environment in terms of cost efficiencies etc

[7]

vii)

Sources of upside potential are as follows:

- Enhance the image of BBI in the eyes of Customer and will be seen as market leader in adoption of disruptive technology to enhance the experience of customer

- They may attract a different segment/generation of customer who use technology or smart phones to buy insurance
- This venture will help BBI to diversify risk between Life Insurance , banking and now general insurance business
- Potentially Enhance the return of shareholder
- They may be able to use their customer base to distribute general insurance products at lower cost of acquisition.
- Possibility to offer a cheaper insurance because of absence of intermediary over the mid to long term and hence gain market share
- BBI has a good credit rating and has the backing of government which may offer the opportunity to access large risk pools through government sponsored schemes

Potential downside risk potential are:

- They have not used this technological platform before and hence exposed to lot of operational risk which may damage the group reputation
- This may make the agents of Life insurance company worried as they may think that they adopt this platform to distribute life insurance too
- No data /experience for running a GI company
- Perception of being a company who will offer cheaper insurance rate due to absence of intermediary
- Competition from existing companies may disrupt their business plans
- It may move the focus of the management from their core business of banking and Life insurance
- Ability to cope up with fast changing technology and solutions offered on the platform to attract customers
- Pressure from Government to support unprofitable government sponsored schemes

[8]

viii)

Key Consideration that need to be considered are as follows:

- Investment needed to put technology infrastructure in place at the time of set up and Maintenance expense needed on annual basis
- Possibility to partner with other technology companies who will provide technology solution to either develop GI product or distribute GI products
- Payback period for the bank and amount of money invested over the first few years to set up GI company
- Regulatory consideration for adopting disruptive technology and if there are industry use cases that can be looked at
- Size of opportunity and projected market share that can be captured
- How it enhance the return of the shareholders for the bank
- Risks that such an opportunity will expose the Bank in undertaking this opportunity
- Does the company has the right skills and expertise to get into this venture
- Willingness and appetite of Government as largest shareholder to enter in this venture
- Consumer concerns that the company could get exposed to
- Time to develop the product and necessary regulatory approvals

- Use cases from other markets for similar solutions proposed
- Use of other allied technology platform – such as Blockchain- that the company need to adopt to continue to be seen as agile and market leader on continual basis

[7]

ix)

Insurer

- +Access to global expertise around UW and product development that the reinsurance may offer to insurer
- +Access to loss data or insights which can help to price the risk better
- +Access to capital from the reinsurer through ceding commission.
- +Increased capacity to write more business
- +Experience on similar solution from other markets could be shared with insurer from reinsurer
- share the revenue or profits with reinsurer and hence reduce the potential upside
- it may reduce the UW discipline in the company to select good risks

Reinsurer

- +Access to risk pool and experience which help to diversify the portfolio of the reinsurer
- +large share will keep the reinsurer invested in the success of the insurer
- +reduced risk of anti-selection from the insurer
- +gain understanding of non-traditional risks which will help the reinsurer to offer better solution to other clients and expand
- capital outflow through ceding commission at time zero
- insurer will not be able to execute strategy and hence bring poor risk
- insurer will have top line pressure to gain market share and hence may lose money.

[6]

[65 Marks]**Solution 2:**

i) Invention and innovation

Invention means the discovery of a new technique. Innovation refers to the implementation of the new technique

Appraising inventions and innovations

By their very nature, such projects will have greater uncertainty than most capital projects. This means more time will need to be spent understanding the underlying risks.

The company should consider whether its historical beta is appropriate for evaluating the new project. The new project may have a significantly different beta to that of the company's normal business. A revised beta should be used if this is the case to determine the true opportunity cost of capital.

Care needs to be taken over the appraisal of economic rents. The company must both understand their existence, and understand the time for which such rents may be enjoyed.

Examples of economic rents are:

- Supernormal profits being made for a period, since there is high demand for the new products and the company is the only producer.
- The protection offered by patents and proprietary technology or production cost advantages compared to competitors.
- Possible contractual advantages – for example, if the company is an exclusive distributor. This is probably not relevant in the given context because the company is the manufacturer

The company should consider the impact (possibly detrimental) on its other lines of business of introducing the new product – not directly relevant for the given context where the company has just started manufacturing products which are at the cutting edge of medical technology.

The company should pay careful attention to valuing any real options associated with the project

[5]

ii)

a)

- Options embedded in real life projects are called real options. Real options are of two types: incremental options and flexibility options.
- An incremental option provides the firm with opportunities to make profitable investments in future
- A flexibility option in project gives the firm a wider latitude in manufacturing so that it can cope better with unforeseen changes and exploit profitable opportunities that come its way.

Financial Options and Real Options

- The information required for valuing options and making decisions about exercising them is more readily available for financial options than for real options.
- While the right to exercise in the context of a financial option is unambiguous, the holder of the real option often is unclear about what the precise right is and how long the same will last

[3]

b) Most capital investment projects contain real options. The nature of real options can be categorised as follows:

- The option to make follow-on investments if the immediate investment project succeeds
- The option to abandon the project
- The option to wait (and learn) before investing

- The option to vary the firm's output or its production methods.
- Such options have value – by retaining flexibility to act in the future, better decisions should be possible utilising emerging knowledge. The conventional discounted cashflow valuation methodologies do not cope adequately with such uncertain situations.
- All of the aforesaid options are embedded in the project undertaken by the company – the important ones being the option to make follow-on investments and the option to vary the firm's output or its production methods based on the refinements that can happen in the medical technology and/ or the bio-engineering space

[5]

c)

- Conventional discounted cashflow valuation methodologies like the NPV approach cannot adequately cope with the estimation of value that may be present in the uncertain situations presented by real options.
- This is because such methodologies ignore these options and thereby implicitly assume that managers act passively during the term of the project. However, management's ability to actively manage projects means that such options always have value whenever there is uncertainty in a situation.
- In many ways, these options are similar to the options available in the investment markets, e.g.: put or call options. The holder of such options has flexibility in terms of deciding whether to go ahead in the light of additional information that emerges. Such options have a value that can be quantified.

[2]

d)

- Standard option pricing techniques can be used to value the real options. Black-Scholes methodology can be used if multi period projections with common characteristics are anticipated. However, the binomial method of risk neutral assessment is more often applicable given that project planning will usually be restricted to a finite, discrete, set of future steps. Such evaluation of the "present value of growth opportunities" can then be added into traditional discounted cash flow type valuations.
- Typically, real options like the options to make follow on investments can be valued using the Black – Scholes Model (BSOPM)
- The Binomial Option Pricing Model (BOPM) is better suited than BSOPM to value real options like the option to abandon; options to wait (timing option); and options to vary output level or production methods.
- Hence in the context of the given project, both the approaches [BSOPM AND BOPM] may have to be used depending upon the type of real option that is being valued.

[5]

iii)

- A stochastic model is used when the inputs to a model are uncertain. The key benefit is that it provides a probability distribution for the model outputs
- Simple models include deterministic models and single scenario based calculations, whereas complex stochastic models usually require a scenario generator to perform many simulations.
- Even within the realm of stochastic models, the company can use closed –form stochastic models which are simpler to use than the more complicated simulation models. For example, if the company is modelling the risk of a “real option” in its project portfolio, it might use Black – Scholes to calculate the exposure and the greeks. The company may not be required to design a simulation model to determine the possible outcomes.
- The choice of model should reflect the complexity of the risk being modelled.
- It should also reflect the timeliness of availability of the measure-if the risk measure is required frequently and at a moment’s notice, simple models are preferred.
- Another important determinant in the choice of model will be accuracy of the data and the accuracy of the model
- It is not advisable to design a complex model if the input assumptions are uncertain and the modelling is subjective. Otherwise it leads to model risk and spurious accuracy. This may be true in the given context because the company’s products are based on cutting edge developments in the bio-engineering space which are not time-tested. Hence adequate data may not be available to make appropriate assumptions related to the technical feasibility, market potential and commercial viability of the project
- Robustness of simple deterministic models can sometimes be improved by basic sensitivity testing and/or scenario analysis to determine the effect of changing the input(s) on the end result.
- Simple deterministic models are cheaper to produce and maintain
- Complex stochastic models are appropriate to model risks of real options if these risks are driven by several underlying variables and most of these variables are stochastic by nature. In such cases the stochastic model will enable the the decision-maker to identify those outliers in the probability distribution of the model outputs which require further investigation.

[7]

iv)

- Lower Costs – The leasing company may be entering into similar arrangements with a large number of firms. Hence the leases are likely to be standardised and the transaction costs low.

- Also, as the lease is secured on the assets used in the manufacturing process (i.e. the assets remain as the property of the leasing company), the underlying interest rate in the lease contract may be less than the company's other unsecured forms of borrowing.
- Hedge Against Technological Risk: This can happen if the lessor is a manufacturer-lessor. Typically such lessors offer innovative lease structures like an "Upgrade Lease Option" which can enable the company to replace the existing leased assets by their technologically superior versions. This can reduce the technological obsolescence risk.
- Full financing – leasing effectively finances the entire cost of the assets. Other forms of financing may only finance a proportion of the cost and require the company to provide the remainder which the company may find difficult given its other financial commitments.
- Alternative sources of finance available for other needs – if the company leases the assets, it can use its other sources of finance, e.g. from its bank, for other needs of the business
- Fewer restrictions on leasing than borrowing – If the company does not opt for lease, it appears the company would have to borrow in order to purchase the assets. There may be restrictive covenants on further borrowing in the terms of agreements with lenders
- Use of tax shield – the leasing company may be able to make better use of the tax allowances available to the owner of the assets to reduce taxable profits and pass on this benefit in the form of lower tax rentals. The new company [lessee] under consideration may not be making taxable profits in the initial years. Hence it may not be able to take advantage of the tax allowance charge
- Cross Border Tax Arbitrage : Some cross-border lease arrangements allow the possibility of "double-dip" which means that both the lessor and lessees can take advantage of the tax allowances for owning the asset because the " financial lease transaction " in the lessor's tax jurisdiction may treat the lessor as the owner of the asset whereas in the lessee's tax jurisdiction the tax law might look at the "lessee" as the owner of the asset because the financial lease transfers a substantial part of the risks and rewards of ownership from the lessor to the lessee.
- Flexible Rental Structures: Unlike conventional loan arrangements, where the repayment schedule is fixed and inflexible, the rental structures under financial lease arrangements are more flexible and can be tailored to suit the cash flow profile of the project. Examples of such rental structures are back- ended leases , deferred leases and leases with a ballooned payment at the end of the lease term

[8]

[35 Marks]
