The Institute of Actuaries of India

Subject SA5 – Finance

14th May 2007

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.

Arpan Thanawala
Chairperson, Examination Committee

Q.1)

(a) [i] Horizontal Merger: A horizontal merger occurs when two firms are engaged in similar activities – for example two companies manufacturing tea – join together to form a single entity.

Conglomerate Merger: A conglomerate merger occurs when two firms in unrelated industries – for example a textile manufacturing company and a shipping company – join together to form a single entity

(a) [ii] Reasons for Undertaking Horizontal Merger :

- Economies of Scale : When two firms combine certain economies are realized due to the larger volume of operations of the combined entity. These economies arise because of the more intensive utilization of production capabilities, distribution networks, engineering services, research & development facilities, IT capabilities so on and so forth. Economies of scale are most prominent in the case of horizontal mergers where the scope for more intensive utilization of resources is greater.
- Of course there can also be diseconomies of scale if the scale of operations and the size of the organization becomes too large and unwieldy. Economists talk of the optimal scale of operation at which the unit cost is minimal. Beyond this optimal point, the unit cost tends to increase
- Complementary Resources : If two firms have complementary resources, then this can be a reason to trigger a horizontal merger. For example, a small firm with an innovative product may need the engineering capability and the marketing reach of a big firm in the same industry. With the merger of the two firms ,it may be possible to successfully manufacture and market the innovative product. Thus the combined firm ,thanks to the complementary resources of the combining firms will be worth more than the two firms separately.
- The combined entity will enable the combining entities to access opportunities available only to larger organizations. For example, a horizontal merger of two property developers may enable the combined entity to bid for very large construction projects.
- One of the potential gains of a horizontal merger is enhanced managerial effectiveness. This may occur if the existing management team of one of the combining entities is performing poorly and the merger can facilitate substitution of a more effective management team.

Reasons for Undertaking Horizontal Merger :

- [a] In order to utilize unused tax benefits – if the two entities have different tax positions, then one may take over the other in order to utilize any valuable unused tax allowances .
- [b] In order to utilize surplus funds – for example, if a company has surplus cash and few profitable opportunities, then it could use the cash to purchase another company's shares.
- [c] Protection against the threat of a takeover – by increasing the size of the business and thus making it more difficult for a third entity to purchase a controlling stake in the combined entity.
- [d] Diversification – Conglomerate merger can help to reduce the exposure of the merged entity to the fortunes of either of the two industrial sectors to which the combining entities belong.
- [e] Can help to enhance the earnings per share of the entity with the higher P/E ratio if this entity takes over another entity for shares rather than cash
- [f] Benefit of lower financing costs – the combined entity may have the advantage of obtaining finance more cheaply than either of the two combining entities because the combined entity ,thanks to its size and scale, may be deemed to be more credit worthy. This advantage exists in those credit markets where large companies are able to obtain finance more cheaply than relatively small companies.
- [g] There may be scope for reduction or elimination of certain overhead expenses –

for example it may be possible to rationalize certain administrative and accounting functions

(b) [i] Reasons for a Large Bank to Buy a Large Life Insurance Company :

- Complementary customer base can provide an opportunity to cross-sell products.
- Cost savings through gains in the efficiency of distribution of short-term and long-term savings products.
- Cost Savings through of economies of scale resulting from increased size and complementary businesses [example : Money Management]
- Potential for profit smoothing of the combined entity resulting in enhanced risk adjusted returns.
- Potential for enhanced returns for the combined entity because the bank typically has a lower cost of capital.

(b) [ii] Reasons for Government 's Reluctance to Approve the Acquisition:

- The life insurance company and the bank may be regulated under completely different rules and by different regulatory authorities. For example, the life insurance companies in India are regulated by the provisions of the Insurance Act, 1938 and by the relevant IRDA Regulations. The regulatory authority is the IRDA [Insurance Regulatory and Development Authority of India]. The banks are regulated under the provisions of the Banking Regulation Act; and the relevant regulatory authority is the Reserve Bank of India.
- The Government may consider that it is either explicitly or implicitly guaranteeing the solvency of the bank; and as such may want the bank to confine itself to the banking business.
- The Government may seek to prevent any company from having a dominant position in its market. The Government might include banks and life insurance companies in the same category for this purpose.

(c) [i] Key Issues to be considered by the Board in the Context of the Merger Proposal :

- [a] The target company is well known and operating in the same industry. Hence it should be straightforward to model the future profitability of the combined entity prior to any approach being made.
- [b] It is expected that significant synergies can be released from the merger. For example, cost savings related to personnel costs, premises, etc would be expected.
- The restructuring process will entail both time and costs.
- While cross-selling benefits are not expected, the removal of one competitor may reduce some pressure on the selling price leading to improve profit margins. However, this cannot be relied upon in the long run because, within limits, new competition can be expected to enter the market.
- The two companies target and actual RoEs [returns on equity] are likely to be quite similar. Once synergies are released it should be possible to improve the RoE for the combined entity – perhaps to a level above the average RoE for the industry. That said, on the longer term, competition could be expected to reduce the RoE back to the industry average.
- In the long run, the benefit of size of the combined entity, might lead to lower betas and potentially increase the number of potential investors and lenders to the combined entity.
- The funding of the merger needs to be considered. Given similar market capitalizations, it is unlikely that Set Airlines can fund a cash bid for the target company. However this option can be explored in conjunction with leveraged finance.
- Instead of a cash bid, the two groups of shareholders might agree to swap

their shares for shares in the new combined entity. Equally the two groups of lenders might agree to lend to the combined entity.

- The composition of the two groups of senior management needs to be considered. It is essential that the surviving management can avoid clashes of style and act expeditiously to integrate the two companies in order to release the promised synergies.

(c) [ii] [1] Nominal cost of capital
= 8.25% + 0.8125*(12.5% - 8.25%)
= 11.70313%

[2] Real cost of capital
= 4% + 0.8125*(12.5% - 8.25%)
= 7.45313%

[3] Net Present value of the "real" cash flows
= 7200*v +10800*v^2+10800*v^3+14400*v^4+ (18000/i)*(v^4)
where v = 1/(1+i)
and i=7.45313%
= Rs.216, 718.86 million

Note to Examiner : The following alternate approach for calculating net present value will also fetch 3.5 marks.
Alternate Approach for Calculating Net Present Value :
Break-even Inflation Rate can be determined from the equation :
(1+e) = 1.1170313/1.0745313
e =0.0395552 or 3.95552%
Present value of the "nominal" cash flows
= 7200*{(1+e)/(1+i)} +10800*[{(1+e)/(1+i)}^2]+
10800*[{(1+e)/(1+i)}^3]+14400*[{(1+e)/(1+i)}^4]
+18000*[{(1+e)/(1+i)}^5]+ {18000*(1+e)^6/(i-e)}*[{1/(1+i)}^5]
= Rs.216,718.86 million
where
i = 11.70313%
e = 3.95552%

(c) [iii] The actual price paid might differ from the net present value of the cash flows due to the financial benefits arising from the following advantages associated with the proposed horizontal merger:

- Economies of Scale
- Ability to tap Complementary Resources

[35]

Q. 2)

(a) Impact on Capital Structure and Appropriate Dividend Policy:

[1] **Raising Funds through Securitization: Impact on return on equity**

Let r (assets), r (debt) and r (equity) denote the returns on the total assets, total debt and equity respectively.

r (assets) = (D/D+E)*r (debt) + (E/D+E)* r (equity)

Given r (debt) =10% and r (equity) =13%
and D: E = 1:2 [before raising additional capital], we get
r (assets) = (1/3)*10% +(2/3)*13%
= 12%
We will assume that the new investments will yield 12%.
Expected return on equity [under the new capital structure after raising the additional

funds] is given by the equation:
(1/4)*10% + (1/4)*7% + (1/2)* r (equity) =12%
Therefore r (equity) = 15.5%

Thus we find that with an increase in leverage, the expected return on equity has increased.

This result is consistent with the findings of a number of empirical studies on the relationship between leverage and return on equity.

[2] **Raising Funds through Additional Equity: Impact on return on equity**

Expected return on equity [under the new capital structure after raising the additional funds] is given by the equation:
(1/4)*10% + (3/4)* r (equity) =12%
Therefore r (equity) = 12.67%
Thus as expected, a decrease in leverage has resulted in a decrease in the return on equity.

[3] Dividend Policy: General Considerations
Before we discuss the impact of the alternative financing strategies on the dividend policy, let us discuss some aspects, which are relevant in this context:

- Increased dividends have been shown empirically to result in an increase in equity prices because investors in general prefer dividends to retained earnings.
- Increased leverage will increase the risk of financial distribution. This may ultimately erode equity values if equity investors' risk tolerance is exceeded. There can be a concern among investors that this would force the management into risky projects and/or following a more liberal payout policy in order to increase equity prices.
- Any change to the existing dividend policy needs be done only after taking into account factors such as
  - Target
  - Expected Trends
  - Impact of any changes
  - Avoidance of future reductions
  - Information delivered through dividend policy

[4] **Impact of Alternative Financing Policies on Dividend Policy**

- If the securitization alternative is pursued, the flexibility of dividend payments is reduced; and it may be more difficult to avoid future reductions. A lower dividend payout ratio may be considered in the short run. This may cause equity prices to fall. However this should ultimately get mitigated by higher expected returns through leverage.
- If the additional equity is pursued, flexibility of dividend payments is increased though expected equity returns have declined. A higher payout ratio may be considered to increase equity prices.

(b) [1] **Raising Funds through Securitization: Impact on Equity & Debt Holders**

- Increased leverage and subordination of debt holders to the investors in the securitized debt may result in a downgrade in the credit rating for the unsecured corporate bonds. This will result in a decline in bond prices, which will not please the bondholders. It will be important to have the continued support of these bondholders because they are going to be the investors in the securitized debt instruments as well. To ensure the continuing support of the bondholders, this may require either an increase in the coupon as compensation or increased restrictions in the bond covenants or a combination of the two.
- It is important to notify the lending banks, which can potentially increase the

charges for the bank facilities on renewal and/or impose tighter restrictions.

- The trustees of the existing debt holders need to be contacted if there is a material change in the assets charged to the bondholders.
- Equity holders will see an increase in leverage, which should increase, expected returns. Also the increased leverage will increase the beta of the stock. This can be of concern to the equity shareholders; and this needs to be addressed by explaining to the shareholders the benefits of being exposed to higher risk.
- A key question on the minds of all investors will be about the utilization of the funds raised through the process of securitization. The management and the directors of the company must outline and articulate an appropriate investment strategy concerning the utilization of these funds.
- Overall it is important to recognize that all of the current investors [with the exception of the banks] will be the investors in the securitized debt as well. Therefore their expectations and concerns need to be carefully managed particularly in light of the fact that there will be contrasting impacts [good for equity holders, not so good for bondholders, etc]. The management and the directors of the company need to ensure that they commit sufficient time to address the concerns so that the proposed securitization can be successfully sold to the existing investors.

[2] **Raising Funds through Additional Equity: Impact on Equity & Debt Holders**

- With a decrease in leverage the credit rating for the existing bonds is likely to remain unaffected or may even get upgraded.
- Unlike the securitization alternative, there will be no need to address the concerns of the debt holders.
- However from the standpoint of maintaining good investor relations, all stakeholders must receive communication about issuing additional equity.
- With a decrease in leverage Equity holders will see a decrease in expected returns. Also the decreased leverage will decrease the beta of the stock. The joint impact of lower expected returns and a lower beta can be seen in the form of a change in the equity stock prices.

[3] **Common Considerations**

- Regardless of which route is chosen to raise funds, there will be significant transaction costs, which need to be communicated to the shareholders and justified. Careful cost management; and association with experienced intermediaries [lawyers, investment banks] is recommended.
- Also the impact of taxes on the funding cost needs to be considered. The MM dividend irrelevance theory depends on a tax neutral regime. However under most tax regimes, dividends tend to be a post-tax payment whereas interest payments on debt tend to be a pre-tax payment. Hence financing with debt is likely to be more cost effective than financing with equity provided the company is profitable.

(c) [1] The risks that the company may run are:

- Interest rate risk on the securitization if long dated fixed rates change
- Credit Spread Risk
- FX risk on purchasing non- dollar denominated European assets
- Equity risk on equity launch.

[2] The hedges that can be considered are as follows:

- Interest Rate Options, Forwards & Swaps: Markets matching the risk are available with good liquidity.
- Credit Default Swaps: These swaps are unlikely to be a good hedge for the securitization spreads.
- FX Forwards & Options: Markets matching the risk are available with good liquidity.
- Equity Market Options & Forwards: Markets matching the market risk are available

with good liquidity.

- Equity Stock Options: Markets matching the specific risk may be available. Care needs to be taken with respect to insider trading.

[3] Effectiveness of Hedges:
The effectiveness of all forwards and swaps depend on knowing the nominal amounts required and the timing of the hedge. This may be very effective in some cases [e.g., amount of bonds issued] but not in other cases [amount of property bought in non-USD markets].
Options will be more effective as they can be executed over various time frames and with variable nominal amounts. However the option premiums need to be included in the overall transaction costs.

[30]

Q) 3.

(a) 1. There are four types of real options:

- The option to make follow-on investments if the immediate investment project succeeds: Under certain circumstances being involved in a project entitles the company to become involved in a subsequent project [if it so desires]. The option to participate in future projects can have value in itself and should be added to the NPV of the project.
- The option to abandon the project: There can be a variety of different ways to approach a project. Some ways might involve a large commitment and others may involve a smaller commitment with an option to continue involvement at a later stage [alternatively viewed as an option to abandon the project at the interim stage]. Although the route that involves the option to abandon may seem more expensive, the flexibility involved is often valuable, as assets can be redirected elsewhere if events turn out to be worse than expected.
- The option to wait [and learn] before investing: If a project seems to have a low IRR, it may be better to delay involvement. At a later stage there may be more information available or the outcome of specific events might be known which make the project more certain or more valuable.
- The option to vary the firm's output or its production methods: Building flexibility into a project may enhance value by allowing future inputs or outputs to be varied. If things turn out well, the company can increase its exposure to the project and vice-versa. This can be characterized as an option to exchange assets

2.Examples of embedded options in this project:

- One example can be that the company can get involved in the future motorway projects in partnership with the Government if its performance is satisfactory in this project
- Another example can be that the company can agree to participate in only the first twenty miles of motorway with the right to be the road builder for further 20 mile stretches at the company's discretion. Although it may seem more expensive, it gives the company the option to abandon. [It can also be viewed as an example of an option to receive follow-on projects].
- It might be possible to build the road over a short period using a large amount of resources or to move more slowly and utilize spare resources elsewhere. This might represent an option to vary the output.

Note to Examiner: Credit can be given for other sensible and relevant examples of embedded options.

3.How such options can be valued?

- The option to acquire follow-on business can often be evaluated using a Black-Scholes approach, whereby the option for follow-on projects is valued as a standard call option and the underlying asset is the expected value of the second project

[which will fluctuate in the future].

- More commonly options to abandon or vary production or timing of production can be valued using the binomial method of risk-neutral valuation.

4.Influencing the NPV or IRR:

- Clearly if such options have value, this value should be added to the NPV of the project [which has been calculated ignoring the option] thus making the project more viable.
- The value of the option can be viewed as a positive cash flow at time zero. If this cash flow is included in the IRR calculation, the resulting IRR will be higher.

(b) To: Mr. CEO
From: YYY
Actuary
Date: **/**/**

Re: Use of RAMP Process in Project Management

Background:

The objective of this report is to explain how the Risk Analysis and Management for Projects [RAMP] process can be used by Roadsal, while making decisions regarding which projects to undertake.

An important part of the decision of whether or not to undertake a project is to understand the risks that are posed by the project and the likely returns from the project. The RAMP process provides a robust approach for identifying, analyzing and reducing risk so that the true viability for each project can be determined.
This report covers:
[1] the RAMP Process
[2] The benefits to Roadsal of using RAMP

[1] The RAMP Process:
[i **] Process Launch** : The first stage of the process is the process launch. A team [an individual or a group] will be set up to lead the examination of the project – in this case the building of the motorway bypass. This team will be responsible for managing the RAMP process from start to end thus ensuring that timely decisions are made in line with Roadsal's objectives.

The team will ensure that the following areas are identified and documented:

- The objectives e.g., level of return required from the project
- The scope of the project, the timing of investment and the use of human resources.
- An Assessment of the strategic value of the project to the company.

The team will also consider the strategy for reviewing risk and managing RAMP including:

- The objectives of the RAMP process itself
- The level of risk analysis to be carried out
- How often the risk will be reviewed during the entire RAMP process
- The budget for the RAMP process

[ii] **Risk Review**: The risk review process is carried out at the outset i.e., at the time the motorway project begins –and then regularly during the lifetime of the project.
The process involves:

- Identifying all significant risks posed by building the motorway and understanding the underlying causes of such risks.
- An appraisal of the types of risk, grouping similar risks together -for example risks with a common cause.
- Assessing risk [or Evaluation of Risks]. The RAMP process aims to understand the financial consequences [in terms of costs, impact on timing] and the likelihood of each risk and also how risks may interrelate.

A model is developed to examine the impact on the likely cash flows from the project of these different risks.
The process can identify catastrophic outcomes [as well as favorable outcomes] together with the likelihood of different outcomes.
The process also examines ways to reduce risk – the risk mitigation strategy. In some instances, risk can be reduced or removed by:

- Reduction – for example, by nominating a risk custodian whose sole job is to guard against a particular risk and initiate early action to reduce it, if necessary.
- Transfer – for example, through insurance
- Avoidance – for example, by redesigning the way the motorway is built and the raw materials are ordered& delivered such as to avoid risk altogether
- Absorption or pooling of the risks with other insurance companies in the Roadsal's sector.

[iii] **Risk Management**: The risk management phase of RAMP involves the implementation of the risk mitigation strategy and the monitoring & management of any remaining risks that have not been fully mitigated.
Typically a risk response plan is prepared which covers :

- Containment plans to avoid risks
- Contingency plans in the event that the risk occurs
- Contingency budgets for the likely effect of the un-mitigated risks

In the light of changing experience the risk review and mitigation process will be revisited regularly and changes made as necessary.

[iv] **Process Close-Down**: At the end of the project, the RAMP process will be reviewed. The objective is to learn from the experience of the project in order to refine the RAMP process for future use. Likewise, the success of the project itself in meeting its financial objectives will be reviewed in order to better carry out projects in the future.

[2] Benefits of Using RAMP:

- The RAMP process will provide Roadsal with a logical and systematic approach for project management. This will ensure that consistent and sound judgments can be made when undertaking all projects, rather than each being managed on an individual basis.
- By pursuing a consistent approach, the project management process can be improved each time and lessons can be learned. In this way, future projects of this scale can be managed more efficiently and with less risk.
- RAMP avoids the tendency to focus only on those risks that can easily be quantified and ignore the more complex risks, which are often those that can lead to disaster.
- RAMP allows the impact of all risks to be combined to assess the overall impact – normally risks are considered in isolation [individually] but not in aggregate.
- The approach will highlight the risks faced by Roadsal at the inception of the project . This means that risks can be more clearly understood and appropriate measures can be initiated at inception for the control of risks.

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