Actuarial Society of India

Examinations

May 2006 Examination

CA11 – Assets

Indicative Solutions

1) An investment in a cruise liner would exhibit similar properties to conventional direct property investments.

Real return: It would be expected that the cruise company would lease back the ship and hence through reviewable rent the AMC can make a real return.

Currency: Will the rent be paid in a currency that the AMC chooses? If not does the AMC have liabilities in the currency?

Unit-size: The unit-size is considerable and hence whether the AMC has enough capital needs to be investigated. This may significantly impact the AMC's diversification and also makes the ship unmarketable.

Unique: Clearly the cruise liner will be unique which will make it very unmarketable.

Valuation: Any valuation will need to be done by skilled experts who will be expensive. There will be no central market.

Maintenance costs: Will the cruise company maintain the ship? If not, the AMC will incur significant on-going expenses.

Obsolescence: A ship will depreciate rapidly due to passenger's needs changing and the harsh environment that it operates in.

Exposure: Cruise companies' are very exposed to the state of the economy since they rely on customers having sufficient disposable income. In addition cruises are exposed to leisure and travel trends which very fickle. These exposures increase the risk of the operator defaulting on rent payments.

Prime: Where will the cruise liner operate? Is it in a prime location or in a developing market? There will be greater risk of defaults in non-prime locations.

Flexibility: A cruise liner investment is inflexible. It would require significant further investment to alter its purpose for example to a cargo ship.

[½ mark per main point,1 for exposure, 1 for operating factors, maximum 6 marks]

2) (i) The discount rate is the current cost of raising incremental capital in order to fund the project. This is the rate of return which needs to be earned on the capital if the existing shareholders are to be no better or worse off.

This should be the bank's cost of raising capital, taking this as a weighted average where the weights are based on the optimum capital structure for the bank between equity and debt.

The cost of equity capital is the current expected total real return on index-linked bonds plus a suitable equity risk premium.

The cost of debt capital is the current expected total real return on index-linked bonds plus a suitable bond risk premium, having regard to the bank's credit rating, and then multiplied by a factor to allow for tax.

As this is the bank's first international venture, the discount rate used should be higher than that used for projects in India.

Ideally the starting point should be the discount rate used by other Indian banks or financial companies which often engage in such projects, adjusted upwards to account for the fact that it is this bank's first such project. In practice it will be difficult to get this information, and the domestic project discount rate should be used with an adjustment to account for the riskiness of the venture. Care must be taken to avoid spurious accuracy.

Although the discount rate needs to be adjusted upwards to take account of the extra risk of this project, care should be taken not to make it too high, as the relative weights placed on short term and longer term will be distorted.

[8 marks]

(ii) If the cashflows occur uniformly throughout the year, the NPV can be estimated by assuming that the total annual cashflow occurs mid-year.

[Full marks can be obtained with any reasonable assumption]

Good: NPV $\quad = -12v^{0.5} + 6.2v^{1.5} + 7.9v^{2.5} + 12.5v^{3.5}$
$\qquad\qquad\quad = $ AED 8,250,000

Average: NPV = AED 930,000

Poor: NPV $\quad = -$ AED 7,620,000

Expected NPV of project = 0.3 * 8.25 + 0.45 * 0.93 + 0.25 * - 7.62
$\qquad\qquad\qquad\qquad = $ AED 990,000

[If it is assumed that cashflows occur at the start of the year the NPVs are:
Good: NPV $\quad = -12 + 6.2v + 7.9v^2 + 12.5v^3$
$\qquad\qquad\quad = $ AED 8,730,000

Average: NPV = AED 980,000

Poor: NPV $\quad = -$ AED 8,070,000

*Expected NPV of project = 0.3 * 8.73 + 0.45 * 0.98 + 0.25 * - 8.07*
$\qquad\qquad\qquad\qquad = $ AED 1,040,000]

[6 marks]

(iii) On average this project is expected to make a profit.

75% of the time, this project would show a profit but on 25% of the time there would be a significant loss. The loss could be as high as AED 7,620,000 or even more, if a scenario worse than 'Poor' occurs.

The results appear to be very volatile with both very large profits and losses depending on the scenario. If this is not expected then the projected cashflows should be examined.

The decision makers should also look at considerations outside the financial analysis, for example:
Any bias or approximations in the estimates;
doubts about the feasibility of entering a relatively unknown market;
any additional benefits such as marketing to NRIs and
any last minute developments.

They should also consider mitigation - insurance against worst outcome – and sensitivity to assumptions.

The decision makers should evaluate this project against other available opportunities and determine whether this fits with other activities of the bank before deciding to proceed.

[6 marks]

3) The investment strategy needs to be consistent with the fund's objectives; any statutory, legal or voluntary restrictions on how the fund may invest; and the amount of risk that the charity and university is prepared to take.

The primary aim of the investment strategy is to meet the liabilities, such as paying for student's hostels and textbooks, of the charity as they fall due.

The strategy will need to reflect:
- ? the nature of the existing liabilities - fixed in monetary terms, real or varying in some other way;
- ? the currency or geographic location of the existing liabilities;
- ? the term of the existing liabilities;
- ? the level of uncertainty of the existing liabilities both in amount and timing.

Other issues need to be considered:

Liquidity: Is there cash coming in due to appeals, benefactors etc.?
          Is cash needed for short term net outgoings such as books?

Tax: What is the tax treatment of different investments?
     What is the tax position of the charitable fund?
     Will any switches of the funds cause tax to be incurred

The size of the assets, both in relation to the liabilities and in absolute terms.

The expected long term return from various asset classes.

Future accrual of liabilities.

The existing portfolio.

Whether to invest in ethical or educational investments or to invest in a way consistent with the university or fund's aims.

Costs of investing – the charitable fund may have limited money to invest but may be able to use the university's investments to make cost savings.

If a change of investments is advised:
What is the cost of switching investments?
Will any losses be capitalised?

[10 marks]

4) **(i)** Institutions may hold a large proportion of their funds in money market investments for the following possible reasons:
?   lots of short-term commitments
?   to be ready to take advantage of other investment opportunities
?   funds need to be kept liquid because of uncertain liabilities
?   need to protect the monetary value of assets
?   recent receipt of large cashflow
?   worried about the prospects for other asset categories
?   use money market instruments denominated in other currencies if worried about the value of the domestic currency.

[2 marks]

(ii) A borrower may issue a Yankee bond because:
?   the borrower has other US dollar denominated liabilities
?   the borrower may be able to borrow at a lower rate of interest by using Yankee bonds instead of domestic bonds
?   the borrower may be a well known in USA
?   the borrower may want access to American investors as well as domestic investors.

[2 marks]

(iii) The fund manager will prefer a quote driven system.

A quote driven system will show prices for all stocks. The prices are adjusted in line with market movements even if the actual stock has not been traded. An order driven system only shows prices for deals.

[2 marks]

(iv) The volatility of a fixed interest bond is defined as the rate of change in the dirty price (P) of the bond for a change in the gross redemption yield (y).

$$\text{Volatility} = -\frac{1}{P}\frac{dP}{dy}$$

Volatility is also known as modified duration.

[2 marks]

5) (i) Regulations typically cover aspects such as:
  ? the categories of assets that can be held
  ? whether unquoted assets can be held
  ? the maximum level of gearing
  ? any tax relief that is available.

[2 marks]

(ii) A life insurer's unit-linked plan is a form of collective investment vehicle and there are advantages and disadvantages to this type of investment when compared with a direct investment:

Control: The investor has little control or influence on the investment decision of the life insurance company.

Inappropriate asset mix: The OEIC may not invest in assets that are appropriate for the investor whereas by buying shares the investor can choose the assets that best suits their particular needs.

Diversification: The unit-linked plan is offering an investment in a diversified portfolio. For an individual this may be essential since they may not have the money to develop their own diversified portfolio in shares.

Simplicity: Investing in unit-linked plans will tend to be a simple exercise. Whereas for an inexperienced small investor buying shares may seem complex.

Expertise: An individual is unlikely to have the same investment expertise as a life insurance company hence and individual with little knowledge can still make sound investments.

Expenses: An individual may have to pay a significant portion of their investment in dealing costs if buying shares directly. However this expense needs to be compared with a life insurer's charges.

Marketability: In general both holding direct shares and unit-linked plans will be marketable. However, where a unit-linked plan has surrender or partial withdrawal restrictions then it may not be marketable. If an individual wishes to invest in illiquid shares then this may be possible through a unit-linked plan.

Tax: Depending on the individual and the precise unit-linked plan there may be tax advantages or disadvantages to each investment.

Gearing: The underlying OEIC may gear itself and thus increase its expected return. However there will an associated increase in risk.

Guarantees: The life insurance company may offer some guarantees on its unit-linked plans which will reduce the risk and the expected return on the investment.

[10 marks]

6) The economic factors influencing bond yields are as follows:

Inflation: Inflation erodes the real value of income and capital payments on fixed coupon bonds. Expectations of a higher rate of inflation are likely to lead to higher bond yields and vice versa.

Short-term interest rates: The yields on short-term bonds are closely related to returns on money market instruments so a reduction in short-term interest rates will almost certainly boost prices of short bonds. However, a cut in interest rates may be interpreted as a sign of monetary easing with inflationary consequences. Therefore long bond yields may fall by a small amount or even rise.

Fiscal deficit: Fiscal deficit is often funded by the government issuing bonds which puts upward pressure on the yields. This will be particularly acute at the durations that the government is targeting with it bond issues.

The exchange rate: Changes in expectations of future movements in the exchange rate will affect the demand for bonds from overseas investors. In addition it will alter the relative attractiveness of domestic and overseas bonds for local investors.

Institutional cashflow: When an institution has an inflow of funds its demand for bonds will increase and hence bond yields can be affected accordingly. Changes to investment philosophy may significantly affect demand and hence bond yields.

Returns on alternative investments: The relative attractiveness of alternative investments will influence the demand for bonds and hence the yields that they offer. If other investments are attractively priced then demand for bonds will fall and the yield will rise.

[7 marks]

7) i)

$$P(t) = \frac{D(t)}{Y(t)} \qquad I(t) = \log\left\{\frac{P(t)}{P(t-1)}\right\}$$

where: P(t) = projected equity price index at time t
D(t) = projected dividend income payable at time t
Y(t) = projected equity dividend yield at time t
I(t) = force of inflation during year t

Date	Dividend Income (Rs.)	Equity Dividend Yield (%)	Equity Price (Rs.)	Inflation
01/04/2007	50.0	8.0%	625.00	
01/04/2008	51.5	7.9%	651.90	4.2%
01/04/2009	52.0	7.8%	666.67	2.2%

[4 marks]

ii) The possibility of negative nominal interest rates needs to be excluded from models because in practice they almost never happen. Negative interest rates would imply that if you lent money now you would be paid back less money than you lent!

The possibility of negative nominal interest rates can be avoided by modelling the log of the relevant interest rate.

[2 marks]

8) Before answering the specific frequently asked questions it is worth highlighting some factors that all personal investors should consider:
- ? What is your existing wealth?
- ? What is your current income relative to your spending?
- ? What do you think your future income relative to spending will be?
- ? How uncertain are you about your future financial position?
- ? What is your personal tax position?

Everyone is unique with personal factors and therefore it is worthwhile seeking expert advice before doing any personal investment. My comments will be in general terms.

Moving onto the specific queries:

(i) Since you have just completed your studies it is unlikely that you have any existing wealth and you may well have some education loans.

Since you are young and have a high level of education you can reasonably expect that your salary will increase at a rate exceeding inflation, in particular in the initial years.

I am assuming that you are unmarried and live in rented accommodation.

Your spending will be mostly on; rent, day to day living, both of which will increase with inflation and your loan repayments, which are probably fixed.

Therefore over time the current small amount of 'spare' income that you have to invest will probably increase.

You need to consider what you are investing for and when? Maybe your first home?

The cost of a wedding, home or bringing up children will all increase with inflation. It is likely that you want to spend your investments in under ten years time. Therefore a short term investment that is expected to grow with inflation would be appropriate.

Bearing in mind the small amount that you have to invest and the short-term that you need returns on your investments it is unlikely that you want to take much risk in your investment. Hence avoid investments that give volatile returns.

The small amounts that you have to invest will mean that any nominal charges or dealing costs may significantly reduce any return on the investment.

You could consider taking insurance or an investment with a guarantee to reduce the uncertainty of your financial position.

With only a small amount of money to invest it is difficult to achieve a diversified investment portfolio and hence using a collective investment vehicle like a mutual fund may help with diversification. In addition using a collective investment vehicle will mean that you are benefiting from expert investment experience.

As always bear in mind that your tax position is likely to change as you earn more income and that some investments may have tax advantages.

(ii) It is likely that you already have considerable investments although you may not realise it. For example; your leave encashment scheme itself has been an investment, but in addition you may well own your own home, and since you are planning on retiring have accrued some retirement benefits.

Without knowing your existing financial situation it is very difficult to make any investment recommendations, however you should consider the following:

- ? What investments do you already have?
  - o It is important to have your investments diversified or spread across several assets. A lump-sum may be sufficient to do this by buying shares if you have the expertise.

- ? Have you already secured a retirement income and is it sufficient?
  - o If not, how do you want to use the investment to boost your income? Some options are; buying an annuity or making investments that yield a high income. However it is unlikely that you will want to take much risk since this is vital for your quality of life and is required in the immediate future.

- ? If you or your wife were to pass away, will the other person be financially cared for? Are there any other possible events that could significantly affect your financial well-being?
  - o You should consider buying insurance to minimise the chance of your financial situation altering if some events occur.

> ? If the lump-sum is a 'bonus' that you do not need to secure your future, what do you want to use the investment for and when?
> > o The important items to consider is how much do you need and when. You will want to choose your investments to target this amount at a particular point of time. However most investments involve some uncertainty and hence you should consider how much risk you are willing to bear.
>
> ? Your personal tax position may well change when you retire and some investments have tax advantages particularly for retirement benefits. The tax position can make a considerable difference as to what return you actually earn on an investment.

It is not necessary to make all the above points to get full marks, however a candidate must demonstrate that they have considered the main points and the differences between the two situations.
[Total 15 marks]

9) (i) Consider prospects for equity and bonds generally plus specifically factors that will affect the investment performance of all the international airlines and the particular airline concerned.

Look at level of existing debt and equity (if any) exposure to this particular company and sector generally:
- ? Security available,
- ? expected return,
- ? costs of purchasing airlines,
- ? business plan,
- ? priorities on income and capital repayment,
- ? levels of cover,
- ? actions of peers,
- ? bank policy and experience,
- ? any statutory requirements (both domestic and international),
- ? marketability of the equity,
- ? country where equity is listed,
- ? currency of returns on debt and equity.

Look at existing capital structure and change proposed

Look at actual swap terms proposed

The bank is in a strong negotiating position since it was approached by the airline but if it is the lead lender it is even stronger.

Does the bank have any expertise in the airline equity sector?

Will this affect the bank's diversification?
[6 marks]

(ii) You need to get as much information as possible since clearly the bank will make a positive presentation about the benefits of the swap. Further independent information may be gathered from:
- ? Industry outlook,
- ? other airline announcements,

? views of suppliers such as fuel and catering,
? your peers in the corporate lending industry.

A fundamental analysis of the airline will be required covering:
? Management,
? product,
? market growth,
? competitive position,
? accounting data.

A visit to the company would be advisable

What is expected to happen to oil prices and will they continue to damage the airline sector's profits?

The economic cycle has a major impact on the airline sector and hence the general outlook for the industry must be examined.

Is the airline making a profit?

What difference will new planes make to the airline's profits?

What are other investors perceptions of future capital, dividend growth and risk?

[5 marks]
[Total 11 marks]

10) The value of the leasehold is (using $i = 12\%$)

$$V = 80{,}000\ddot{a}_5^{(4)} + 95{,}000 \text{x} 1.06^5 \text{x} v^5 \text{x } \ddot{a}_5^{(4)} + \ldots + 95{,}000 \text{x} 1.06^{30} v^{30}\, \ddot{a}_5^{(4)}$$

This simplifies to :

$$V = 80{,}000\ddot{a}_{5@12\%}^{(4)} + 95{,}000 \text{x} 1.06^5 \text{x} v^{5@12\%} \text{x } \ddot{a}_{5@12\%}^{(4)}\, \ddot{a}_{6j}$$

or $$V = 95{,}000\ddot{a}_{5@12\%}^{(4)} \left(a_{6j} + \frac{80}{95} \right)$$

$$where \frac{1}{1 ? j} ? \left\{ \frac{1.06}{1.12} \right\}^5$$

So the value is Rs.1.248 crore.

[5 marks]

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