Institute of Actuaries of India

Subject CA1 – Paper I

Core Applications Concepts

November 2008 Examination

INDICATIVE SOLUTION

Introduction

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

1 (a) Money market investments have the following key features:

- security depends on issuer
- all return is through mostly income
- level of income has a loose, indirect link with inflation
- lower expected returns than equities or bonds over the long term
- stable market values
- short term
- minimal dealing expenses
- normally highly marketable

(b) The market is dominated by the clearing banks who use the instruments to lend excess liquidity funds and to borrow when they need short term funds. Central banks, as lender of last resort, stand ready to provide liquidity to the banking system. Central banks also use their own operations to establish the level of short-term interest rates.

[5]

2. (a) Commonly used tools to measure downside risk are:

- Value at Risk
- stress testing

Value at Risk is the potential loss over a given time period with a given confidence interval.
Stress testing involves testing for weaknesses in a portfolio by subjecting it to extreme market movements.

(b) A commercial bank is exposed to substantial amounts of credit risk and market risk (particularly with regards to interest rates). As such, useful stress tests might include:

- testing how the asset and liability values respond to a 1% increase in short- and long-term interest rates, together with the level of default on floating interest rate loans, change from fixed to a floating loan or vice versa if there is flexibility to customer on the choice of type of loan
- testing how the surplus might react to an extreme default event – for example default in repayment of loans accompanied by falling asset values

[5]

3. (a)

- Reduce employee future contributions-contribution holiday
- Consider a spread of surplus over a long period to reduce the volatility of employer's contributions.
- Increase benefits to existing employees, offer discretionally one time increase to pensioners
- Consider buying out existing liabilities e.g. existing pensions in payment or deferred pensions to reduce risk carried by the employer.
- Provide higher risk benefits, insure risk benefits,
- Consider looking at more aggressive investment options in particular the diversification of assets and the asset types held

(b) While considering any such options the trustees has to consider

- ? The impact this strategy is projected to have on the costs of the scheme.
- ? How best to communicate this strategy to the employees.
- ? Avoiding any disputes with any unions. and achieving employee agreement.
- ? Trust scheme and rules and Local regulations

[5]

4. Types of cover:

- ? property insurance to protect against fire, storm, flood and other hazards
- ? business interruption cover to protect against loss of profits after damage to contents or buildings
- ? provide insurance against theft of equipment ,
- ? employer's liability against claims from the staff
- ? possibly public liability against claims for negligence from the customers and employees.

  As a means to retain staff-
- ? Employee life insurance, cover as it is expanding company as an incentive for retaining staff
- ? Employee disability insurance cover where unable to do current job
- ? Employee health insurance cover for basic medical conditions/operations.

[6]

5. (i) When providing advice to the company the actuary needs to be careful to clearly outline the results of the exercise with an explanation at an appropriate level.

The advice will also include a discussion of possible alternative solutions and the implications of each of these solutions.

The actuary should explain the implications of all of the alternative solutions on both the client and other stakeholders who may be affected by them.

The assumptions made in reaching each of the solutions should be explained, together with the reasons for making the specific assumptions.

The results need to be presented objectively, with it being left to the company's directors to decide which solution to adopt.

(ii) If the actuary is also a company director then conflicts of interest may arise, and appropriate safeguards may need to be put in place.

In particular there is a danger that:

- ? the board will be unduly swayed by the actuary's recommendations
- ? the actions taken would not be viewed by other parties (*eg* regulators or shareholders) as being independent.

The actuary should always make it clear which .hat. he is wearing in any meeting/report, *ie* advisor or fellow director.

In order to avoid these problems further advice should be sought or peer review of the decision made.

[6]

6. (a) The costs will be controlled and managed by:

- Creating and maintain a centralised data base of employees, having unique identification numbers

- Creating a centralized salary record or requiring employers to supply records as required

  Reviewing ongoing costs periodically. *eg* by requiring proof initially and on a regular basis that an individual continues to be absent from work and eligible to the benefit .

- Taking steps to reduce fraudulent claims. *eg* spot checks and pursuing prosecution of cheats

(b) Make benefit a %age of net rather than gross salary or a fixed level

Increase deferral period from two months
Require more employer involvement
Make benefit means-tested
Encourage back to work schemes

[6]

7 (a) The more likely the convertible loan stock is to be converted, the greater the extent to which its value will more closely reflect those factors that influence the value of the underlying equity shares into which it converts.

Conversely, if conversion seems unlikely, then the convertible's value will be closely related to that of the equivalent conventional loan stock.

In the case of to conversion to equity, important macroeconomic factors will be expectations of –

- *real* economic growth, which will influence the level of real dividends expected subsequent to conversion at the end of 5 years
- *real* interest rates, which will affect both the level of real economic activity and hence dividends, and also the value that investors place upon those dividends
- expectations of inflation, which will have indirect effects upon real economic variables and hence future growth.
- the general level of uncertainty affecting the economy may also affect the equity risk premium.
- Credit/country risk

In case of non conversion, the most important macroeconomic factors will be expectations of inflation and real interest rates.

(b) *Factors to take into account*

Industry prospects in which the company is compared to other industries

The future prospects for of the company in comparison to other companies in the same industry

How are other alternative investments performing?

How does company fit t into my existing portfolio, current exposure levels, what is level of diversification offered in terms of industry, asset class?

What is the size of issue , availability of sufficient volumes (if large exposure is needed), minimum/maximum subscription, liquidity available for investment

Value conferred by the option compared to an outright equity purchase

The marketability of the convertible loan stock and the ordinary shares the company.

[8]

8. (a) (i) The capital required to finance the office's business activities is for

- the expected strain that is expected to arise for writing policies of micro sizes sizes proportionately increased by the volume of business expected to be written.
- Development costs need to be allowed for. These could include marketing, systems I improvements and additional staff and administration costs.
- Regulatory capital required to write such business

(ii) Capital requirements for each year are then assessed from the cash flows arising i.e. Premium plus investment returns less claims, expenses, tax and changes in reserves, including solvency margin.
Experience assumptions must be consistent; it is not sufficient to project these independently.

(b) The following principal experience assumptions may be required:

- Expense assumptions- per policy, per 1000 SA, premium based
- Commission or other marketing and sales expenses
- Mortality assumptions
- Lapse assumptions
- Investment return assumptions
- Inflation assumptions
- Tax assumptions

- Volumes of new business assumptions
- Reinsurance in flow and out flow if reinsurance is proposed

[8]

9 (a) The freeholder owns the site on which the property stands.

A free holder is entitled to all proceeds from the property both income and capital gains. He can sell part of the rights to a leaseholder. At the end of the lease ownership will revert to the freeholder.

A leaseholder is entitled to rent from the users of the property for a given term. An agreement will set out the level of rent and the procedures for rent reviews (normally upward only) and the obligations of each party. At the end of the lease, the leaseholder will not receive any capital.

Normally the leaseholder pays rent to the freeholder – this will be different from the rent it receives. Leases can be traded but they are not very marketable.

(b) Price = Rent1 * a_{n1} + v^{n1} * Rent2 * $a_{(n2-n1)}$ + v^{n2}* Rent3 * $a_{(n3-n2)}$ +…………
Where a_{ni} is annuity certain for ni years

The initial rent is level at Rent1. There will be rent reviews at times n1, n2,…. Rent should be net of expenses and tax.

It is assumed that the rent is received in perpetuity. No allowance is made for refurbishment or modernization. This should be consistent with the level of rent R1, R2 etc.

Rents are discounted at an appropriate discount rate, which should allow for risks in the property, particularly of void periods.

(c)Comparing the two types of property investment:

- Both are prime property investments.
- Both offer potentially high returns with a degree of inflation protection over the long term.
- The shops are freehold whereas the offices are leasehold. Freeholds may be considered more attractive due to
    - their greater flexibility
    - being easier to borrow against
    - . greater marketability
    - . not suffering from eventual loss of capital value.
- Shops likely to have smaller unit sizes.
- Rent may be a bigger proportion of a shop tenant's outgoings, making the rental stream less secure with higher tenant turnover.
- Offices can be multi-let, offering lower risk of default.

- ? Depreciation is normally lower for shops (shops are usually supplied to retailers as empty shells) which may enhance returns.
- ? A greater proportion of a shop's value is attributable to underlying site value, so shops may offer increased security.

[13]

10. (a) The Company may decide to offer shares because

(i) it needs additional finance to develop the programming
(ii) it needs to reduce/diversify its risk
(iii) it may have other projects it needs capital for
(iv) it needs help to develop/maximize the revenue stream and is seeking an appropriate partner for this
(v) The promoters wish to offload some stake at a profit as they consider this as an opportune moment but at the same time retain management control

The Company may need additional finance to-

- o Make technology investments to make the broadcasting up to date
- o It may have large debts or other liabilities (e.g. tax) that it wants to clear.
- o Purchasing broadcasting rights for other league games or other sports
- o For marketing and publicity

(b) The main reason would be because he expects to get a good return.

The investor may consider that the revenue from broadcasting is good over the medium and long term as the prospects of the game and the league itself is good and the channel owns the exclusive broadcasting rights.

The company has good chance of winning some new deals which will boost its revenues further

The investor may have other operations, such as other media companies that could lead to gains from synergies.

This investment will have particularly different features to other traded shares, and therefore the investor could benefit from diversification.

(c) The balance sheet will set out the assets and liabilities of the Company. Investor would want to check that nothing unexpected was present and that what they expect to see is covered.

A major point will be to check that the values given in the balance sheet are realistic and to consider the accounting regime under which they are prepared.

Level of good will in the Balance sheet- exclusive broadcasting rights, how the purchase has been funded and at what terms

Type of loans- secured or unsecured, rate of interest , how has the purchase of broadcasting rights been financed

Level of current assets and liabilities – receivables and provisioning for bad debts- defaults from ad agencies,

Types of revenues- ad bookings, other income. Is there any observable trend

[16]

11. (a) The claim analysis would involve-

- Analysis of CI claims
- Analysis of normal mortality experience –post CI events and others

The extent of the analysis will depend on the volume of business written. The aim is to split the data into homogeneous groups whilst keeping the volume of data within each group credible

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The investigation may be carried out on both by number and SA.

The analysis would be performed to cover the experience for each year since commencement. If changes in terms and conditions or premium rates have happened over the 10 year period then analysis should be carried out separately for the 2 time periods.

Foe the analysis required the grouping should be as -

- Sex
- Age
- Duration since inception
- Sales Channel
- Type of illness
- Medical/non-medical cases
- Occupation
- Sum assured
- Premium size
- Premium payment method

(b) Assumptions are required for both the current level of critical illness experience and the expected future changes in this over the duration of the contract.

In interpreting the experience, care needs to be taken to allow for any features that may have impacted on the experience over the period of the investigation that may make it an unreliable guide for future experience. Most recent years experience would be more relevant than prior years experience.

The experience can also be compared with any published CI experience studies in the industry, country or with reinsurer.

The trend in experience for recent years would be used to help make an assumption about the expected future trend in critical illness experience. If the volume of data were sufficient this trend would be considered separately for each type of illness to understand better the causes of the experience.

(c)The analysis may not be relevant because -

- Underwriting standards may have changed over the period of the investigation.
- The experience if based on small volumes of data may not be credible.
- Changes in the sales process or the target market over the period of the investigation may affect experience.
- The company may have reduced its premiums or there could have been reductions in market premium rates over the period of investigation. This may have led to selective lapses and worse experience.
- Changes in the definition of a critical illness or the critical illness covered over the period of the investigation will distort results.
- Changes in claims underwriting standards- Consumerist pressure may lead to more pressure in future to admit claims that do not meet the strict definition.
- medical advances may lead to earlier detections of critical illnesses or more routine operations in future such that past trends are not indicative of the future.
- Particular medical advances that are not expected to continue in future may have caused past trends in experience.
- Post CI claims recovery could have changed considerably due to changes in medical practices/

[22]
(Total 100 Marks)

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