

# **EXAMINATION**

September 2007

## **Subject CA1 — Core Applications Concepts**

### **Paper 2**

#### **Introduction**

The attached subject report has been written by the Principal Examiner with the aim of helping candidates. The questions and comments are based around Core Reading as the interpretation of the syllabus to which the examiners are working. They have however given credit for any alternative approach or interpretation which they consider to be reasonable.

M A Stocker  
Chairman of the Board of Examiners

December 2007

#### **Comments**

Comments on individual questions are given in the solutions that follow.

- 1** Nominal yield = risk free real yield + expected future inflation + inflation risk premium.

The inflation risk premium reflects the additional yield required by investors with real liabilities for bearing the risk of uncertain future inflation.

*This was generally answered well, although candidates who failed to give a formula had difficulty describing the relationship in words.*

- 2** (i) Specify the problem — set long term strategic objectives for the investment management of the fund. These might include guidelines on the types of investment permitted, minimum/maximum limits in asset types, sectors and individual stocks, and target performance benchmarks.

Developing the solution — consider the types of investments that best fit the long term strategy, and select suitable high quality investment managers to operate the strategy.

Monitoring the experience — regular monitoring of all arrangements in place relative to the objectives and performance targets, and feeding back the results to modify the original solution.

All the above needs to be carried out with a professional approach and in the context of the general and commercial environment.

- (ii) Monitoring should be focused on the different decision points in the cycle, to ensure departures from targeted outcome are identified and assessed. This should incorporate regular reassessment of both assets and liabilities to determine whether the investment objectives remain appropriate for the current and expected future situation.

At the investment manager level — will need to monitor both performance and risks undertaken.

At the management structure level — will need to analyse suitable manager types (value/growth, large/mid/small cap, active/passive) and decide whether the overall balance is still appropriate.

At the strategic level — assessment of the asset types that fit the strategic objectives will be required, along with consideration of whether any investment limits are still appropriate.

Regular assessment on whether there are new asset classes that should be considered will also be required.

*Part (i) was answered well, with most candidates pitching their solution at the right level of detail given the marks available. In part (ii) answers were in general not sufficiently wide-ranging. Most candidates focussed on performance measurement against a benchmark, and*

*did not consider the more strategic matching issues. As usual candidates wrote "regulation" and "tax" down without putting the points in context. Some candidates write these two words in the answer to every question in the hope that sometime they will get some marks for them.*

### **3 Advantages of purchasing Company B**

This may be a cheaper option, depending on the sale price.

It may be difficult to obtain a licence to start a new company in this particular country. It may also be harder for a foreign company than a local company to sell business.

Starting from scratch may be made more difficult by language or cultural barriers.

Could make use of otherwise unavailable tax losses or other synergies. *Note that in this case, the simple phrase "Tax benefits" was not enough.*

Purchase would gain experienced staff who understand the regulatory and taxation environment. Staff will also already be trained in the type of products sold in this country. There would also be no need to recruit staff, which can be costly and time-consuming.

Company B would have existing infrastructure generating possible expense synergies, such as company properties, systems for administration, accounting, and valuation.

Acquisition of existing business gives an immediate market presence and the opportunity for cross-selling. It will be possible to sell new business immediately. It may be possible to continue using an existing brand that already has a market reputation. This would also remove potential competition. Company B may have an existing client base and salesforce or relationships with agents.

Company B will have past experience analyses which can use as part of actuarial control cycle to set assumptions for future pricing.

There will be an immediate investment performance track record.

### **Disadvantages of purchasing Company B**

It is necessary to consider why Company B is being sold.

- Its market reputation may be bad.
- There may be legacy problems with Company B's business, which may be a drain on management time and a potential reputational risk.
- The purchase price may be over-inflated, for example in a bidding war or auction.

Company A may wish to sell different types of product than those currently being offered, and the conversion would therefore still take time and money to achieve.

Company B might not adapt easily to Company A's internal culture. It may have to put in place measures to ensure that key staff do not leave on change of ownership.

There may be elements of Company B that are not attractive, and which might be expensive to dispose of.

Company A may have to find more initial capital to finance the purchase than if grew organically. This might have an effect on the dividend payments to shareholders in the short term, or might increase the company's gearing.

Company B may have legacy employee benefit issues (such as pension deficits) or dependencies on its parent company for some services, e.g. investment.

*This question enabled the better candidates to shine, while the less good tended to misread or misunderstand it. Note that the question states that the company has already made the decision to sell business offshore. Many candidates considered the advantages and disadvantages of a move offshore, for which no credit was given. A well structured and planned answer really gained benefits. The unstructured answers were very repetitive, wasting much time without gaining additional marks.*

- 4** (i) The investment characteristics of real property:
- a real asset that is expected to provide a hedge against unanticipated inflation;
  - a running yield typically between that available on equities and bonds;
  - rental income subject to infrequent rent reviews (may be upwards only);
  - very unmarketable;
  - high dealing costs;
  - security of income depends on the quality of the tenant, and on risk of voids;
  - capital values can be volatile over the longer term;
  - susceptible to Government controls;
  - buildings suffer from obsolescence and property maintenance costs, but land always likely to have some value;
  - there are management costs – rent collection, rent reviews, new leases, etc.
  - unit size is large;
  - each property is unique;
  - no central market with quoted property prices so no real value known until sold;
  - valuation is a matter of professional judgement;
  - investment characteristics can be changed by the owner/marriage value.

- (ii) Direct property values tend to be less volatile than property shares in the short term because the true picture is obscured by the effect of long periods between valuations.

Property shares are in a company therefore the price will depend on the value of the company itself which is only partly dependent on the value of the underlying properties. The company can smooth the return to investors through its dividend policy.

Property companies usually are financially geared, direct property is not usually geared. Financial gearing increases the risk from property shares but could increase the long term expected returns.

In the longer term property shares may provide greater stability as they provide diversification that may not be possible with direct investment due to the large size of individual properties.

Property companies undertake higher value added property investment activity, such as development, providing higher returns longer term than direct property.

Property shares may provide higher returns by being bought at a discount to net asset value.

Property shares may be subject to losses if the company has a cash flow problem, however, direct property is only exposed to forced sale losses if the investor becomes a forced seller.

Property shares are much more marketable than direct property, which may affect the return.

The tax treatment of direct property and property shares may differ, depending on the territory concerned, impacting the returns achieved.

Property shares may provide economies of scale and so provide cost savings compared with direct property. Direct investment may allow the investor greater control over management costs and so generate extra return.

*Part (i) was answered well by most candidates. In part (ii), some candidates did not appreciate that 'property companies' will experience some of the features of direct property investment because they invest in real property along with other activities, so that their results will reflect this. Many candidates failed to read the question and discussed the different features of direct property investment and property companies, failing to concentrate on the returns from the two asset types. The better answers said "direct is... but shares are ... and this means ...", all in the context of returns.*

- 5 (i) Consider a spread of surplus over a long period to reduce the volatility of employer's contributions.

Consider buying out existing liabilities e.g. existing pensions in payment or deferred pensions to reduce risk carried by the employer.

Ensure that any risk benefits are insured.

Amend remuneration structure to control pensionable salary growth.

Consider an Asset/Liability model to look at any asset-liability mis-match, and amend the investment policy to minimise this.

Review the following items and consider whether a change would impact the volatility of the contribution rate:

- The level of risk accepted by the Investment policy, in particular the diversification of assets and the asset types held.
- Currency mismatching risk between assets and liabilities.
- Closing to new entrants by amending employment contracts.
- The Funding method and funding assumptions adopted e.g. advance funding to reduce volatility.
- Any policy for awarding discretionary benefits — for example, discretionary pension increases or early retirements at the company's discretion.
- The policy on transfers in and out of the scheme.
- The charges made by the advisors to the scheme, possibly requiring fixed fees.

- (ii) It is necessary to consider:

- The impact this strategy is projected to have on the costs of the scheme.
  - Which price index to use.
  - Whether the company can maintain such control on the salaries.
  - How best to communicate this strategy to the employees.
  - Avoiding any disputes with any unions.
  - Achieving employee agreement.
  - When the strategy can commence.
  - Whether new administration/payroll systems will be required.
  - Whether the strategy will affect recruitment.
  - Or retention of employees.

(iii) Table extended to show the following:

<b>A</b> <b>Age</b> <b>nearest</b> <b>x</b>	<b>B</b> <i>Average</i> <i>pensionable</i> <i>salary at this</i> <i>valuation</i>	<b>C</b> <i>Average</i> <i>pensionable</i> <i>salary at last</i> <i>valuation</i>	<b>D</b> <b>Actual</b> <b>promotional</b> <b>salary</b> <b>growth over</b> <b>the period</b> $= (B/C)/1.06^\dagger$	<b>E</b> <b>Expected</b> <b>promotional</b> <b>salary</b> <b>growth over</b> <b>the period</b> $= s_x/s_{x-3}$	<b>F</b> <b>Actual /</b> <b>Expected</b> <b>percentage</b> <b>over the</b> <b>period</b> $= D/E$
<b>38</b>	31374	28980	<b>102.1%</b>	<b>106.7%</b>	<b>95.7%</b>
<b>39</b>	28841	25776	<b>105.6%</b>	<b>106.6%</b>	<b>99.0%</b>
<b>40</b>	57894	53646	<b>101.8%</b>	<b>106.0%</b>	<b>96.0%</b>
<b>41</b>	37640	34676	<b>102.4%</b>	<b>105.0%</b>	<b>97.5%</b>
<b>42</b>	32415	30160	<b>101.4%</b>	<b>104.1%</b>	<b>97.4%</b>

$\dagger$  the total cost of living 1.06 is calculated from  $1.018 \times 1.008 \times 1.033$

Notes:

- the columns in **bold** above are required in the solution
- non-bold columns are not required in the solution but are shown above for reference

Marks were given for:

- a layout in a format that makes it clear that the instruction “extend the table” has been reasonably followed
- Showing calculation of total cost of living increases:  
 $1.018 * 1.008 * 1.033 = 1.060006752$  or 1.06
- Calculating total cost of living increases correctly
- Showing correct formula for actual growth calculation (column D)  
i.e.:  $D = (B/C)/1.06$  (or alternatively  $= (B/C)/1.06 - 1$ )
- Calculating all actual growth formula figures correctly (column D)
- Showing correct formulae for expected growth calculation (column E)  
i.e.:  $E = s_x/s_{x-3}$
- Calculating all expected growth formula figures correctly (column E)
- Showing correct formula on column F
- Calculating all column F figures correctly from D & E

The question does not specify that percentages are expected in the tables in columns D and E, although the approach of using absolute values will mean that it will be almost impossible to derive column F, where a percentage is required. Therefore marks were given where absolute value calculations were used. The results are:

<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>
<b>Age nearest x</b>	<b>Average pensionable salary at this valuation</b>	<b>Average pensionable salary at last valuation</b>	<b>Actual promotional salary growth over the period =B-(C*1.06)</b>	<b>Expected promotional salary growth over the period =C*s<sub>x</sub>/s<sub>x-3</sub></b>
<b>38</b>	31374	28980	<b>655.2</b>	<b>1949.3</b>
<b>39</b>	28841	25776	<b>1518.4</b>	<b>1695.8</b>
<b>40</b>	57894	53646	<b>1029.2</b>	<b>3223.4</b>
<b>41</b>	37640	34676	<b>883.4</b>	<b>1748.4</b>
<b>42</b>	32415	30160	<b>445.4</b>	<b>1241.2</b>

A candidate who went on to ratio columns D and E to generate an incorrect column F (for which there were no marks), should have noticed that age 39 is an outlier. Candidates who commented on this feature in their answer to part (iv) were given credit for any sensible comments made in both (iv) (a) and (iv) (b).

- (iv) (a) Additional data is required to assess the credibility of the analysis, for example, membership numbers and/or total salaries.

The A/E figures are all reasonably close to 100%, but they are all below 100%. This indicates that the promotional scale has overstated the promotional salary growth experienced by this slice of the membership over this period.

The overstatement is roughly 1% pa for these members, which may result from the intentional use of a smooth or prudent scale.

- (b) A full salary analysis should be considered over the whole membership, isolating special one-off features from long term trends.

It might be possible to consider national statistics or industry data.

If the analysis indicates that the experience of this membership extract is representative of the experience of the whole membership and if the recent experience can be taken as a guide to the future long term expectations then there may be a case for reviewing the assumption for the promotional scale.

This would be in conjunction with discussions with the company regarding any stated intent on the anticipated pattern of promotions,

the level of pensionable salary increases awarded on promotion, and the desired level of prudence in funding the pension scheme.

*In answering part (i) some candidates proposed changes to the scheme's benefit structure, despite the information given in the question. Reduction in the level of contributions was not required, only in the volatility of the contribution rate. Many candidates talked about instituting a closer matching policy, but for full marks it was necessary to explain how this reduces volatility.*

*Part (ii) was generally well answered, although many candidates went into far too much detail for the number of marks available. Apart from the interpretation issues covered above part (iii) was attempted well, although a significant number of candidates were frightened by the need to use a calculator, and gave up without trying!*

*“Comment on results” questions are often the easiest ones set, as there are a lot of marks for simply describing the results achieved. In part (iv) most candidates failed to comment on the restricted range of ages analysed and the need to extend the investigation to cover all ages. The final part highlighted a general lack of understanding of what the purpose of the exercise was. The aim is to assess the salary scale used for the valuation to see if it is still suitable. The whole focus of the question is on the pension scheme and not on the company's remuneration policy. Many candidates seemed to regard the point as to assess whether the new remuneration practice was fair or working properly.*

- 6** (i) Underwriting at the proposal stage can be used to manage risk in the following ways:

It can protect a life insurance company from anti-selection, and in particular is used to identify lives whose health is so seriously impaired that they would have to be deferred or declined.

It also identifies risk arising from geographical location, occupation and lifestyle.

The underwriting process will enable a company to identify lives with a substandard health risk for whom special terms would need to be quoted.

A company may however aim to accept a large proportion of the business it accepts at standard rates of premium.

For the substandard risks, the underwriting process will identify the most suitable approach and level for the special terms to be offered.

Adequate risk classification within the underwriting process will help to ensure that all risks are rated fairly.

Underwriting will help in ensuring that actual mortality experience does not depart too much from that assumed in the pricing of the contracts being sold.

For larger proposals the financial underwriting process will help to reduce the risk from over insurance.

Lives could be individually underwritten rather than being put into broad risk bands.

Claims underwriting will be used for admitting and monitoring claims on products such as Income Protection and Critical Illness. It can also be used to assess the validity of other claims, for example, by checking for non-disclosure and implementing exclusion clauses.

The standard of underwriting can influence the reinsurance terms that might be available.

- (ii) Evidence can be obtained from the following sources:
- Questions on the application or proposal form completed by the applicant.
  - Reports from medical doctors that the applicant has consulted.
  - A medical examination and report carried out on the applicant.
  - Specialist medical tests (such as AIDS/HIV test).
  - Applicant's answers to further questions asked by the company, such as lifestyle questions.
  - Previous applications to this or other insurers.
- (iii) There will be a significant cost in constructing the points table, changing the company's systems, and then maintaining the table in the future. The company has been writing business for many years, so should have sufficient data to construct the table, at least for the most common conditions. This is likely to involve analysis of all past applications, the results of the medical examinations and the company's specialist's conclusion.

For lives who have died, the appropriateness of the underwriting decision can also be reviewed.

It is likely that reinsurers would wish to review the terms offered.

The benefit is that for the most common conditions the expense of the medical examination and the specialist's analysis of the report can be avoided. There would be an offset in terms of additional processing carried out by the company's staff.

However, as the decision is based on less detailed information, a greater margin for risk will need to be built into the assessment. In terms of the rates offered, the additional risk margin might offset the effect of the expense saving.

Lives in poor health, who may not be employed, may have need of their pension quickly. The more efficient process may be of great value to them, as the time in the underwriting process will be greatly reduced.

However for conditions that are just beyond assessment by the points table, the process will be lengthened, and the original process will have to be followed once the points table result indicates that further information is necessary.

The company may be prepared to accept a measure of self-certification for simple conditions — for example that the applicant is a smoker or a diabetic, and for small policies. This would save the cost of obtaining a full medical examination.

Even if self-disclosure is limited, checking the applicant's statements with a general practitioner is likely to be more efficient and cheaper than a medical examination. The company is trying to confirm the extent of a condition the applicant says he has, not find out if he is suffering from one of many conditions denied.

The company may find that its mix of business changes. For example it might increase sales to lives who can be assessed using the points table. As the points table is derived for common conditions, where most data are available, this might reduce the company's overall risk.

If the company's points table was in the public domain, it might be copied by competitors, thus offsetting the unique selling point.

*Parts (i) and (ii) were bookwork, and generally answered well. In part (iii), most candidates did not give enough attention to the problems associated with developing and maintaining the points table. This part was answered less well than the rest of the question. To succeed, candidates needed to have a clear view of their intended answer before starting to write, otherwise answers were confused and repetitive. Sadly many candidates quoted bookwork without considering the context – assuming that there could be lapse and re-entry issues with annuities, for example.*

- 7** (i) The company can ensure good quality policy data by ensuring consistency between its sources of data. For example between the proposal form and underwriting data; and between the claims form and claims underwriting data. This enables cross-checking between policy and claims data.

Questions on the forms need to be unambiguous, sufficiently detailed to obtain all information needed, and in a format that enables information to be readily transferred to the database, and cases where additional underwriting is needed to be identified quickly.

Staff should be adequately trained to collect data and enter it correctly into the database.

There should be reasonableness checks on the data.

- (ii) XL reinsurance is non proportional cover. The reinsurer will pay claims over an “excess point” up to an upper limit, beyond which the insurer is back on risk. It is possible to have several layers.
- (iii) Reasons for XL reinsurance:
- to accept risks that might give rise to large claims.
  - to reduce the financial effects of claim fluctuations.
  - to stabilise technical results.

The company might consider Risk XL in order to protect against a large individual loss, for example damage to a very large building, or very high third party personal injury claims.

It might consider Catastrophe XL in order to protect against large losses arising from a single event, for example a very large number of claims from a storm, or a number of very large claims (such as from a terrorist incident).

It might consider Aggregate XL, in order to protect against an unusually high number of claims over a period from a particular peril, for example, a large number of flood damage claims arising during an extended period of wet weather.

It might consider Stop Loss, in order to protect against unexpectedly high claims over a whole class of business, or even the company's whole account.

*Note that no credit was given for all the standard points about the benefits of reinsurance that many candidates made.- technical support from reinsurer, etc.*

- (iv) Alternative risk transfer might be considered:
- to provide cover that might otherwise be unavailable
  - to stabilise results
  - because it is cheaper
  - if there are tax advantages
  
  - for greater security of payment if there is a claim
  - to manage solvency margins
  - for more effective risk management, e.g. diversification of risk portfolio
  - as a source of capital.
- (v) An energy company which will make less profit if winter weather is warm — can swap with the insurer's greater claims costs from cold weather.

A water company which will replenish its reservoirs if very wet weather — can swap with the insurer's greater claims costs from flood.

A building firm whose profits will increase when they get more work after a windstorm — can swap with the insurer's greater claims costs.

*Credit was given for similar sensible suggestions. If more than two examples were given, the two best were marked. The examples need to be distinct. For example the effects of the weather on an electricity company and on a gas company are really the same example.*

*Much of this question involved reproduction of sections of the core reading. Part (i) was well answered. Most candidates got the main point sought in part (ii), but the majority wrote far too much given that only two marks were available. In part (iii) many candidates were not sufficiently precise in defining the various categories of XL reinsurance. The examples given were rather limited.*

*Candidates who recalled the section of the core reading on alternative risk transfer generally dealt with the final two parts of the question well, but a significant proportion struggled with them. In part (v) most candidates did not adequately explain how the insurance company could benefit from the swaps proposed.*

## **END OF EXAMINERS' REPORT**