

EXAMINATION

September 2005

Subject CA1 — Core Applications Concepts

Paper 1 (Assets)

EXAMINERS' REPORT

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.

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Chairman of the Board of Examiners

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The division of the syllabus and core reading for CA1 into two parts for the 2005 and 2006 examinations in order to cope with the transition arrangements between the old and new examination strategies leads to an unbalanced split in the examination papers. The paper 1 syllabus and reading is shorter and more straightforward than that for paper 2. As expected the standard of candidates' solutions was considerably better in this paper than in paper 2.

As the title of the course suggests, this subject examines applications of the core techniques and considers broad actuarial concepts in practical situations. To perform well in this subject requires good general business awareness and the ability to use common sense in the situations posed, as much as learning the content of the core reading.

The notes that follow are not to be interpreted as model solutions. Although they contain the majority of the points that the examiners were looking for, they also contain more than even the best prepared candidate could be expected to write in the time allowed in the examination room.

1 Cash is less attractive:

- when generally falling interest rates result in strengthening in both bond and equity markets;
- at the end of a recession, if it is thought that equity markets will have high returns;
- When corporate bond prices are rising, either due to falling credit spreads or rising credit ratings;
- if the strength of the national currency makes cash investments in other currencies less attractive;
- if the investor has temporary low short term liquidity requirements;
- when inflation is higher than interest rates.

This question asked for the reverse of a situation detailed in the core reading. Despite this, few candidates scored well.

2 Corporate bond portfolios are often constructed to meet specific constraints and the benchmark will need to reflect this.

The yield will be a key feature of the portfolio, as will the risk profile of the portfolio for risk adjusted returns. Portfolios may be set up with a particularly high yield, for a high income portfolio (or due to different tax treatment of income versus gains).

Credit rating is also important. Many portfolios will have a stated minimum credit rating.

Duration: depending on the purpose of the portfolio (e.g. pension scheme), the duration of the bonds may be short, medium, long or broad spectrum.

Size of issue/liquidity: some portfolios may specialise in small, unmarketable holdings under the belief that they will ultimately provide better returns.

Country of origin/currency: the benchmark will need to reflect the country of origin and the currency of the portfolio.

Nature fixed/index-linked/hybrid: portfolios may be fixed income or index-linked (less common with corporate bonds, or a hybrid of both).

This question was not generally well answered. Most candidates gave some sensible points, but only the better candidates provided a broad range of features to be considered.

- 3**
- A clear identification of the objectives of the project
 - Statements as to how these objectives will be met
 - The acceptable quality standards for meeting the objective
 - The project sponsor's role
 - The role of any third parties
 - The financial and economic objectives
 - Details of the expected cost of the project
 - The financing policy
 - The policy for arbitration/dealing with legal issues
 - The need for insurance or reinsurance
 - The technical policy
 - A structured breakdown of the work to be completed under the project
 - The key milestones and timeframe for reviewing the project
 - The risk management policy
 - The communications policy
 - The information technology policy

This is a straightforward piece of bookwork and, as expected, was answered well by most candidates.

- 4**
- This is a process and once you determine an acceptable price you stop.

Whilst the portfolio contains bonds with low liquidity, small volumes of some holdings may be regularly traded, so there may be some readily available market prices. Prices and timings of recent transactions should be checked.

If yield curves, credit spreads and firms' credit ratings have remained stable since recent transactions, the price may be acceptable. However, still need to consider whether it was a willing seller/willing buyer transaction.

Market makers / brokers may be able to provide indicative prices. Compare these with prices of other bonds with similar credit rating, maturity, liquidity and terms.

A stochastic economic model could be used to produce a market consistent price, i.e. to revalue the bond based on other bonds with similar credit rating, maturity and terms, but for some hybrid bonds, e.g. sinking funds and convertibles, the price may not be reliable.

The most recent price could be adjusted by the movement in an appropriate index — although it may be difficult to find such an index.

Failing this the most recent price might have to be used, but this will not give a fair value unless very recent.

This question was very poorly answered. A clear, structured, logical approach was being looked for, which considered the sources of information available to arrive at a value and the potential problems with that information. A stochastic economic model is not a panacea as most candidates assumed.

5 (i) Expectations theory describes the shape of the yield curve as being determined by economic factors, which drive the market's expectations for future short-term interest rates.

(ii) Liquidity preference theory: Investors require a greater return to encourage them to commit funds for a longer period so yields should be higher than expected for long-dated stocks.

Inflation risk premium: Inflation risk is greater in the long term so yields should be higher than expected for long-dated stocks.

Market segmentation / Preferred habitat theory: Yields at each term are determined by supply and demand from investors with liabilities of that term, so yields on short and long bonds may therefore move somewhat independently.

(iii) The yield of any fixed interest security is a function of the price. The price will be influenced by the laws of supply and demand.

In a perfect market with purchasers who are not influenced by sentiment there are some objective reasons for yield differences.

In general, government bonds provide the most secure and marketable fixed interest investment in a particular currency, and in developed economies they are risk free.

Investors will require a higher yield on other forms of debt. The size of the yield margin depends on both the credit (default) risk and the marketability of the corporate bond issue.

A particular bond may have high credit risk: due to a low credit rating (specific risk) or due to high credit spreads in the relevant sector (systematic risk).

It may have low marketability due to small issue size or because it is infrequently traded.

The issue may have features that make it particularly desirable/undesirable to certain classes of investor, for example a high coupon might attract institutional investors.

Investors are concerned with post-tax returns, so different tax treatment between government and corporate bonds are reflected in the yield.

Parts (i) and (ii) were answered well by most candidates. In part (iii), as in question 2, only the better candidates wrote a broad enough range of points. Other answers were somewhat superficial.

- 6** (i) It is vital that the valuations of the trust's assets and liabilities are consistent.

Either the assets can be valued at market value and the liabilities valued at appropriate market-based discount rate, or both assets and liabilities could be valued using the same interest rate, which would normally be the long-term expected return on the assets. It will be necessary to allow for dividend growth on the equities.

Any market value will imply an expected rate of return that is linked to the riskiness of the asset. Because the portfolio contains both equities and bonds, using a single discount rate to value all assets may therefore be inappropriate because of the different extent of risk. Different discount rates could therefore be used depending on the riskiness, marketability and term of the assets.

It may be difficult or impractical to establish a market related valuation basis for liabilities

- (ii) The expected return on the conventional bonds can be taken to be the gross redemption yield (GRY).

$$\text{GRY} = \text{real yield on index-linked bonds} + \text{expected inflation} + \text{inflation risk premium}.$$

To gain full marks all terms needed to be defined as well as a correct equation given.

- (iii) The trust needs to decide whether it wants to plan for future prizes to be increased in line with inflation. If so, does it wish to anticipate the future increases by matching the liabilities on this basis.

One way of doing this would be a move to index-linked securities. This may not be a perfect match if the securities used a different inflation index to that used for the prize.

Conventional bond yields will rise (i.e. price will fall) relative to index-linked bonds if investors' expectations for future inflation rise or if the size of the

inflation risk premium rises. Under these circumstances, real yields and prices of index-linked bonds will not necessarily change.

Thus, if the trust's investment manager expects future inflation to be higher than that implied by the difference between nominal and real yields in the market, index-linked bonds would be more attractive than conventional bonds.

The investment manager may also have a different view of the inflation risk premium. If inflation is negative or very low he may prefer to keep the prize money unchanged and therefore conventional bonds would match the liabilities.

Index linked bonds need to be available in the country and currency concerned, and to have a spread of durations available for matching liabilities.

Part (i) and (ii) was generally well answered. In part (iii), few candidates considered whether the trustees would continue the past practice of increasing the prize money annually in future or whether index linked bonds used an appropriate inflation index, although most candidates made the basic points.

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(i) Step 1

Make a high-level preliminary risk analysis to confirm that the project does not obviously have such a high risk profile that it is not worth analysing further. For example, a clear risk is that the finance cannot be raised.

It is important to determine where the finance is likely to come from and who is managing the process of raising it.

Step 2

Hold a brainstorming session of project experts and senior internal and external people who are used to thinking strategically about the long-term.

The aim is to identify project risks, both likely and unlikely; to discuss these risks and their interdependency; and to attempt to place a broad initial evaluation on each risk, both for frequency of occurrence and probable consequences if it does occur.

The session should also generate initial mitigation options and discuss them briefly.

Step 3

Carry out a desktop analysis to supplement the results from the brainstorming session by identifying further risks and mitigation options, researching previous similar projects and the problems that were encountered.

Obtain the considered opinions of experts who are familiar with the details of the project and the outline plans for financing it.

Step 4

Set out all the identified risks in a risk register, with cross references to other risks where there is interdependency.

Step 5

Ensure that upside risks as well as downside risks are covered.

(ii) *Only six risks and the corresponding mitigations are needed to gain full marks*

- (a) Cost of project higher than expected
- (b) Time taken to complete project longer than expected
- (c) Complex does not appeal to local residents
- (d) Complex does not attract tourists
- (e) Running costs higher than expected
- (f) Planning permission not granted
- (g) Opposition to project
- (h) Construction problems
- (i) Insolvency of contractors
- (j) Problems obtaining finance
- (k) Problems obtaining further finance if costs overrun
- (l) Fraud/crime
- (m) Industrial relations problems
- (n) Natural disasters

(iii) Corresponding mitigation:

- (a) All areas of the project should be well planned and researched and costed at each stage.
- (b) Each part of the project should be planned in advance to ensure the project is completed on time and action should be taken at the first sign of overrun.
- (c) Carry out market research and give local residents a say in the process. Special discounts or passes to the centre could be used.
- (d) Compare with similar projects in different cities and make any suitable changes. Carry out market research on current tourists.
- (e) Investigate costs in all areas of similar complexes and consider the factors likely to increase these in future.
- (f) Find out whether planning permission has been granted to similar types of project locally and in other areas and adjust plans if necessary to increase likelihood of acceptance.

- (g) Carry out research to see whether any opposition exists and on what grounds and adjust plans if necessary.
- (h) Consider all aspects of the construction process and ensure they have all been used successfully in the past and that there are clear procedures on what to do in the event of any problems.
- (i) Research the financial backgrounds of contractors and do not rely on just one contractor.
- (j) Ensure finance is in place before starting the project.
- (k) Ensure there are agreements with providers of finance on procedures to follow.
- (l) Research the backgrounds of all companies and key personnel.
- (m) Maintain open communications channels with works and their representatives so that issues are raised and resolved.
- (n) Purchase insurance to protect against unforeseen natural disasters

Marks were given for any other reasonable mitigation options.

All parts of this question were reasonably well answered, and candidates generally proposed sensible mitigation options for the risks they identified.

8 (i) Economic growth

Lowering short rates encourages investment spending by firms, and increases the level of consumer spending.

There can be a considerable lag between lowering interest rates and a pick-up in growth.

Capital investment spending by firms increases employment levels and therefore incomes, but it takes time for firms to plan and build new production facilities before they start producing goods.

To increase consumer spending you need to do one or more of:

- (a) Increase disposable income by reducing the cost of servicing existing debt — the effect will be more immediate if borrowing is generally at floating rather than fixed rates.
- (b) Discourage savings and / or encourage spending of savings — lower interest rates provide less reward for saving, however, consumers need

confidence (e.g. job security or prospects) before savings are turned to spending.

- (c) Encourage personal borrowing — lower interest rates make borrowing cheaper, however, consumers need confidence (e.g. job security or prospects) before borrowing to spend.

The return of consumer confidence will take time to emerge.

Exchange rate

Initially the exchange rate should fall.

Lower interest rates reduce the demand for the domestic currency.

Lower exchange rates should increase the competitiveness of all exports. This is despite increasing the cost of imported materials used in production.

Lower exchange rates should increase the relative competitiveness and demand for domestically produced goods and services stimulating domestic growth in the next two years.

Inflation

Lower exchange rates will increase the cost of imported goods and services leading to supply side inflation. The impact on the inflation rate will depend on whether these higher costs can be passed on to consumers. Weak demand and the presence of domestic alternatives are a limiting influence.

The use of forward currency contracts will create a longer lag.

Lower real interest rates mean an increased quantity of money is demanded which is met by an increase in the money supply. This can lead to inflation (demand side). Demand side inflation typically has a longer lag than economic growth.

(ii) Equity market

The level of equity markets is primarily determined by expectations of future economic growth.

Real interest rates are more important than nominal ones so it is the real interest rates which should be considered.

Cutting interest rates should stimulate economic activity, increase corporate profitability and future dividends, and thus raise equity prices.

If investors are worried about inflationary pressure caused by the cut in rates, there may be a move away from fixed interest towards equity investment, as

equities provide a better hedge against future inflation. This would again push up the level of equity markets.

More competitive exports due to a weaker domestic currency should increase corporate profitability. The higher cost of imported raw materials will however decrease profitability to the extent that costs cannot be passed on to consumers.

The higher the proportion of corporate profits earned abroad, the greater the depreciation of the local currency and the bigger the boost for equities.

Commercial property market

A starting point of recession will mean relatively low demand for commercial and industrial premises. A reduction in interest rates should increase demand.

As economic growth picks up, levels of employment in the service sector should increase and demand for offices will pick up substantially.

Property prices are highly dependent on supply. The time lag between an increase in demand for property and the development of new property can cause rapid increases in the price of property. By the time new properties are developed, the economy may well have slowed down again.

As expectations of future inflation rise, institutional investment in property may also rise, as property has traditionally provided a good hedge against inflation.

Where overseas investors are significant purchasers of property the exchange rate will have an effect on demand levels.

In part (i) most candidates got the key points, however, very few candidates appreciated that for the interest rate reduction to be effective consumers and companies would need confidence, and that this may take a considerable time to emerge.

END OF EXAMINERS' REPORT