Faculty of Actuaries **Institute of Actuaries**

EXAMINATION

September 2005

Subject SA5 — Finance
Specialist Applications

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.

M Flaherty
Chairman of the Board of Examiners

29 November 2005

1 (i) The default loss trigger must be unique and unambiguous. It will define the term "natural peril" as including windstorms, earthquakes, floods and tsunamis. It will define the maximum period over which the event can occur. For example, the bond issuer (the insured) might be able to pick any 72 hour period for an earthquake and any one week period for a flood. Finally it will define the minimum size of the catastrophe to be covered. It might define the loss by physical size or by amount. For example, earthquakes measured at 7 or more on the richter scale might be covered. Alternatively earthquakes resulting in insured losses excess of say USD5bn might be covered. Either way, third party experts would be called upon to confirm the size of the event.

(ii) The investment bank will arrange for the creation of a special purpose vehicle (SPV). The SPV is likely to be created as a Trust. The SPV will issue the bonds. The bond principal will be retained by the Trust and invested in virtually riskless fixed or floating rate investments designed to pay a part of the regular coupon payments owing to the bond holders. The investment will have to be sufficiently liquid to allow the trustee to make timely payment to the company in a default event.

(iii) Hence, if at any time during the 5 year period a defined event were to occur of at least the minimum size then the bond would default and the principal would be paid to the company.

The transaction principals would be the company and the bond holders. Other parties would include an investment bank, lawyers, administrator trustee and most likely accountants/tax advisers.

The company would appoint an investment bank to advise on the transaction, arrange for the creation of the SPV and to issue the bond. The company might ask the investment bank to underwrite the issue in order to lock in a minimum price.

The investment bank will likely advise the company on whether to issue a fixed or floating rate bond depending on market conditions. The company will be paying the regular coupons during the term of the bond. If the bond is say floating rate and the company would prefer to pay fixed rate then the bank will arrange for a fixed to floating rate swap for the company.

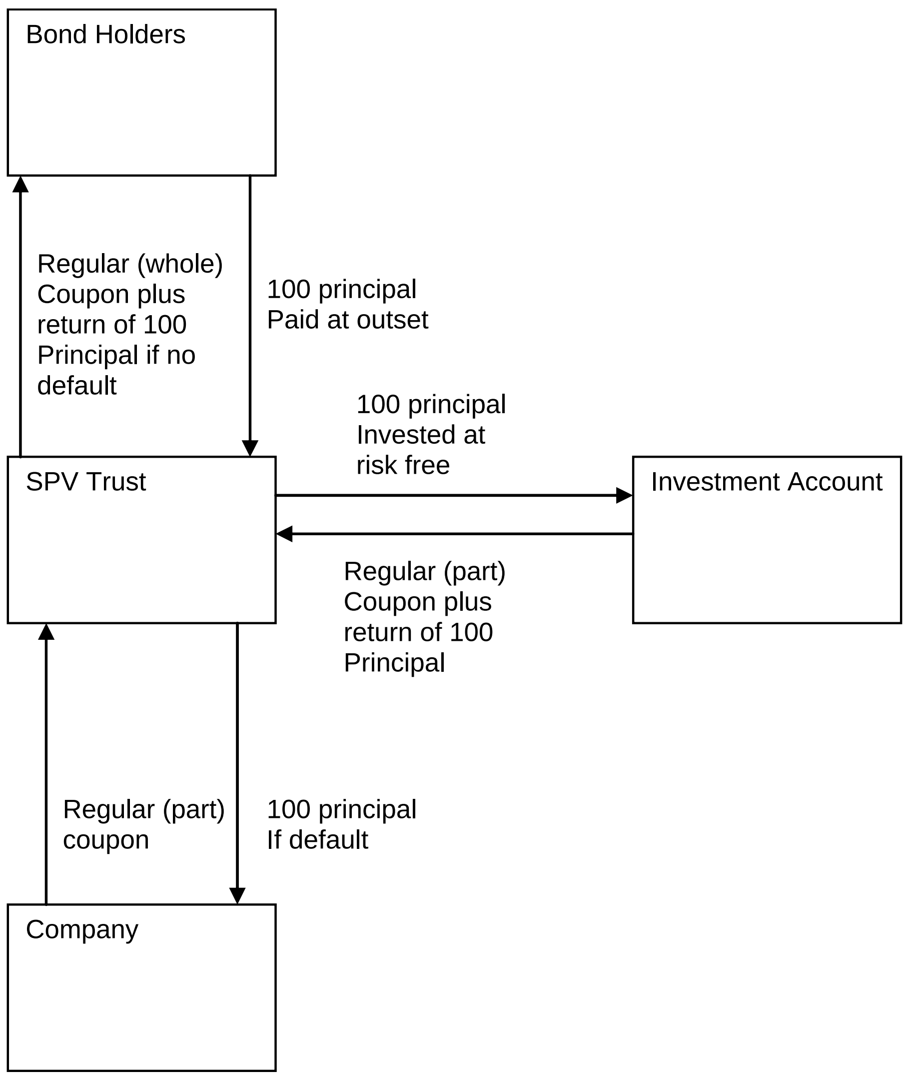
The investment bank will advise the company on the potential range of investors and the legal and regulatory requirements which must be followed to offer the bond to these investors. Having agreed the target market of investors the company will appoint lawyers to prepare the investor memorandum.

Importantly the company will only receive the bond principal in the event of a defined catastrophic event causing the bond to default.

Over the term of the bond the bond holders will receive their regular coupons and the return of the principal from the trustee unless a catastrophe occurs. If the catastrophe occurs, the bond has defaulted and no further coupon payments will be made and the principal will be lost.

If the company were to become bankrupt or be placed in administration or otherwise fail to meet its coupon obligations during the term of the bond then the bond holders would receive their principal back and the bond would mature.

Hence, if a defined event occurs during the term of the bond, then on the first such event, the company would receive the bond principal without any obligation to repay.



(iv) The main risk is the risk that a natural peril of the requisite type and size will occur at anytime during the term. Of course, the issue here is the probability of the occurrence as it is a feature of the bond that if the occurrence happens then the whole of the principal is lost. That is, the loss given default is 100%.

The CRA will consider the term of the transaction. Clearly the catastrophe risk modeller will factor the term into the model but the CRA is likely to add more uncertainty and hence risk (of default) into the results as the term increases.

In addition, the CRA will consider the structure terms and conditions and ascertain whether there are any structural risks to the bond holder's receipt of coupons and/or return of principal.

The CRA will review the establishing documents of the SPV and its jurisdiction to see if there are any risks of non-performance.

The CRA will take account of any default loss risk arising from the investment account.

The CRA will consider the impact, if any, of the company defaulting on its obligations. Clearly if the bond is floating rate then break costs of early repayment would be very low and the possibility of the bond holders failing to receive a part of the accrued coupon would have relatively little impact on the rating.

(v) 30/9/2005

Dear Sir

Tokyo Shopping Centre — Risk Control Report

1 Introduction

You have asked me to prepare the following report with respect to the risk of loss to or from the Tokyo Shopping Centre resulting from a natural perils catastrophic event.

The Tokyo Shopping Centre is situated in Tokyo, Japan. It was newly opened in March, 2005 at a total project cost of USD80m. It is a multi-storey design with two major brand department store retailer sponsors and 46 speciality shops. There is an attaching indoor multi-story car park for 200 cars.

The shopping centre management and stores employ approximately 800 staff on site. The centre may host several thousand shoppers at any one time.

2 Risk Sources and Loss Potential

History suggests that Tokyo is susceptible to both earthquakes and windstorms. Tsunamis (large waves caused by underwater earth movements) are comparatively rare but plausible. Floods are highly unlikely.

The buildings have been designed to withstand earthquakes measured at richter scale 7 and below and windstorms measured at force 8 and below. Cosmetic damage and damage to stock in trade (protected by the tenants themselves) can be expected for events of any size but structural damage should only occur above these design points.

Rents are charged as a percentage of turnover and as such we are exposed to business interruption losses.

In summary, for minor events one might expect cosmetic losses of between \$1m and \$5m and business interruption losses of between \$1m and \$3m (being up to say 3 months) for minor catastrophe events. For major events and more particularly events which are more extreme than those for which the building has been designed to withstand, the property loss could be anything approaching the replacement cost of the building currently estimated to be more than \$100m plus business interruption losses which could of course be substantial and more than \$10m.

In addition a sudden event could give rise to personal injury and death amongst the centre's employees and its customers. Compensation will depend on the circumstances and the blame attached to the centre but could rise into several tens of millions of dollars.

3 Actions and Procedures

Centre management should ensure that the building is properly maintained and that safety procedures are adhered to.

The disaster plan should be regularly reviewed and updated as necessary. Evacuation procedures and the like should be practiced on a regular basis. The objective of the disaster plan will be to protect human life, minimise personal injury, minimise physical damage and to restore normal operations as soon as possible. The disaster plan should include management succession, evacuation procedures, and restoration procedures including appointed clean up operators.

4 The Catastrophe Bond vs Conventional Insurance

The catastrophe bond is not a contract of indemnity. If the defined event occurs with the required intensity then the whole amount of \$100m will be paid to the company whether or not the company has suffered a loss. Equally the centre could suffer a loss from a nondefined event and/or a low intensity event which would not trigger the payment under the catastrophe bond. In other words there exists significant scope of the bond to not respond to the loss.

Conventional insurance is a contract of indemnity. The insurer will pay for the insured losses up to the agreed limit.

Conventional insurance requires full disclosure and allows the insurer to dispute the claim. The trustee of the SPV will pay the bond proceeds without delay should the defined event occur.

The bond is a 5 year transaction unless an earlier event occurs. The cost is known up front. Conventional insurance is purchased annually at a price agreed at the outset of the year. The bond offers greater certainty over both capacity and price.

The price of the catastrophe cover under the bond is the excess coupon paid by the company from time to time. The price of the insurance is the insurance premium agreed from year to year.

Yours sincerely,

(vi) The company will not have any right to receive the principal until a default occurs. Nor will the company have any right to the interest from the investment account.

The company will be able to tax deduct the (part) coupons paid from time to time.

The company will be able to tax deduct the up front transaction costs and most likely pro-rata over the 5 year term of the transaction.

Should the company receive the bond principal then it will be treated as income and taxed in the year of receipt. Correspondingly the company may have incurred a substantial and tax deductible loss from damage to the centre.

The rate of corporation tax is 30%.

(vii) Conventional insurance is held on the liability side of the insurer's balance sheet. In the UK and in other countries the insurer would be expected to hold capital by a solvency margin against the risk.

The bond will be held on the asset side of the balance sheet and may escape the requirement to hold capital against the risk.

With conventional insurance the insurer will receive a premium and bring this to profit on a straight line basis over the term of the insurance. For the bond, the insurer will receive a coupon and bring this to profit on an accrual basis.

The insurer may need to regularly revalue the bond holding to market value. Insurance contracts are not directly revalued to market.

There may be some secondary market to trade the bond. There will be no secondary market to trade the insurance contract (apart from risk transfer through reinsurance) albeit that the term of the insurance is only 1 year.

Insurers often aggregate their catastrophe risks and then buy reinsurance to protect themselves from any over-exposures. It would be easy for the insurer to fail to include the catastrophe bond in this aggregation exercise.

The bond offers a known coupon for 5 years providing an event does not occur. Insurance is typically re-rated annually giving the insurer some chance to increase rates should market conditions allow. Equally, the bond protects the insurer from falling premium rates.

Under the bond the insurer is not involved in the decision to pay the principal (claim) and it is for the full amount. For insurance, the insurer can dispute the payment and as only the loss amount is paid, the claim may be for less than the limit.

(viii) The current UK solvency regulations (as per the core reading) do not employ risk based capital. As such the insurer would be required to hold capital against the risk if it were written as insurance but would not be required to hold capital against the risk if it were written as a bond investment.

2 (i) The cooperative's shareholders likely received their shares for free or at very low prices. They are not marketable as such and hence the shareholders might be willing to sell them at a relatively low price. The raider is highly unlikely to be interested in keeping the cooperative intact. Instead he will raise debt finance to buy it and then immediately sell a part of it to repay the part or all of the debt leaving the raider with a "free" or low cost albeit smaller company. Given that the building societies have been demutualising it is likely that at least some of them were doing so for the purpose of raising new capital. Costs of regulation and competition have made it increasingly difficult for small non-bank financial institutions to make adequate returns. As such the raider likely believes he will find a number of interested buyers for the savings and loan operation. Hence after the sale and after the acquisition debt has been largely or wholly repaid the raider will be left with the supermarket chain. This is likely to be floated on the share market to repay any remaining debt and to allow the corporate raider to make a cash profit from the transaction.

(ii) The transaction principals are the corporate raider, the cooperative's board of directors, the cooperative's shareholders and the structured debt lenders (funding the acquisition). The other parties will include the investment bank adviser to the raider, the raider's legal/accounting/tax advisers, the FSA, cooperative's legal adviser and potentially the cooperative's investment bank adviser.

The cooperative will not be listed and hence the transaction may not be within the purview of the Takeover Panel.

The raider will approach the investment bank with the original idea and any available data/information.

The investment bank will agree to advise the raider and they will agree terms.

The investment will prepare a memorandum to show to potential debt lenders. The memorandum will describe the proposed transaction, the approximate amount of debt needed, the time of the drawdown and the anticipated repayment sources and dates.

At the same time as the debt memorandum is being prepared the investment bank will construct a discounted cash flow evaluation model to better understand the likely enterprise value of the cooperative. Among other things the model will be used to help make the original offer price to shareholders, assess the likely break up value of the operations and the potential for listing the remaining operation(s).

Finding interested debt lenders and constructing the model will likely take 4 to 6 weeks.

As the cooperative is not listed, the raider and his advisers may then seek a meeting with the cooperative's board. The raider will disclose at least some of his intentions and the board will need to decide whether to recommend the takeover to the shareholders.

If the board agrees to the approach it may be willing to allow the raider to undertake a due diligence for say 2 to 4 weeks. The purpose of the due diligence is to allow the raider to better understand the operations and to hopefully improve the price that he is willing to offer the shareholders.

If the board does not agree with the bid then the board may decide to announce this approach to its shareholders and advise them to not sell. In this case the raider is unlikely to be able to conduct a formal due diligence process. Instead he will need to make a hostile bid for the shares based on the available information.

Either way, through the investment bank, he might make an offer for the shares of the cooperative on the condition that he receives minimum acceptances sufficient to allow him to compulsorily acquire all of the shares. He might give the shareholders one or two months to agree to sell.

If the bid is successful the debt lenders will release the moneys to buy the shares.

(iii) It would almost certainly be necessary to (1) value the assets and liabilities on a break up basis and (2) construct a discounted cash flow financial model (DCF) of the cooperative.

The break up basis will give insight into potentially hidden assets and liabilities. For example assets might be capable of being revalued and sold to help to repay the acquisition debt.

The DCF model will comprise future profit and loss statements and balance sheets on a cash basis to predict the future profitability of the operations.

It will be necessary to conduct the analysis separately for each operation and combined as there is a strong likelihood that an operation will be sold following the acquisition and that the remaining operation(s) will be listed.

The model will have to show how and when the acquisition debt will be repaid or refinanced.

The cooperative is likely to be a relatively complex organisation and as it is not listed there will likely be very limited access to information.

Problems encountered in the analysis may include:

- valuing excess assets, or the cost of additional required investment
- valuing multiple activities undertaken
- valuation of goodwill
- valuation of unfamiliar activities and markets
- existing contractual arrangements
- problems of staff relationships (and redundancies)
- valuation of the cooperative's pension fund(s)
- outstanding financial obligations, minority interests, tax

As noted above the available published information is likely to be very scant and could include short form annual reports and trading statements. One would wish to receive information covering at least the past 3 years to be able to assess trends. Also one would hope that the most recent information was no more than about 3 months out of date.

Clearly the information available would depend on whether the cooperative's recommended the bid and allowed a due diligence to be conducted. The due diligence would provide access to considerably more information.

The basic information required for assessment is likely to relate mainly to equity net cash flow i.e. the benefits that will accrue to the purchaser. Information required includes:

1. Financial accounts in sufficient detail to allow the estimation of future profits, plus depreciation, available to equity shareholders, net of tax.

2. The current value of all surplus assets not required to earn the profits in 1. above.

3. The replacement cost of non-surplus assets, and the estimation of when replacement will be required.

4. The amount, and timing, of any loan or debt redemption.

The model would project several years into the future and then assume that each operation were sold at a price which was similar to the price paid for it as a multiple of the then earnings. When projecting forward the model parameters will be varied to consider all of the different ways in which the cooperative might develop i.e. operations sold, expanded, opportunities for cost savings etc.

(iv) (a)

The investment bank will be regulated by the FSA. Corporate finance advice is a regulated activity to be conducted by registered individuals.

The FSA would investigate the circumstances. It is likely to find that the investment bank had failed to know its client and had failed to ensure that its employees complied with the all of the requirements of the FSMA and rules made under it.

With respect to the registered individuals performing the work in the investment bank the FSA is likely to find that they did not behave honestly or with integrity.

The FSA can take disciplinary action including:

- public announcements
- fines
- conditions on future business
- obtaining a court injunction
- ordering compensation for customers
- withdrawing authorisation
- prohibiting any individual from carrying out regulated activities

(b)

As the investment bank probably conducts a number of other activities and as it probably has a reasonably good record with the FSA it would be likely that the FSA would fine the bank, order it to pay compensation to the cooperative, and make a public announcement stating the actions it had taken. The fine and compensation would be at least several hundred thousand pounds and commensurate with the size of the transaction.

As a consequence the bank would likely have to fire a number of staff. The bank's reputation would suffer with a likely loss of future business. The bank may also expect to receive greater attention from the FSA for at least the next few years.

With respect to the registered individuals the FSA is likely to fine them and to prohibit them from carrying out any regulated activity for a number of years. The ban may effectively prohibit them from working in any regulated activity in any capacity.

(v) Cooperative's management will likely embark on a marketing program to its members extolling the virtues of being a cooperative and owned by its members. It is likely to contact its members more regularly by newsletter to try to increase the value of the cooperative in the member's minds.

The cooperative may seek to repay surplus cash to its members either irregularly or more likely through a dividend structure and perhaps based on the account balances of the individual shareholders.

The cooperative may seek to introduce a number of poison pill style arrangements. For example it might try to require future shareholders to donate any capital gain to charity.

The cooperative may seek to overhaul its operations to make them more efficient and more profitable. This would help to reduce the potential for a raider to profit from simply applying superior management to the current operations.

The cooperative may seek a listing on the share market in the hope that in the future its share price may more closely reflect their inherent value.

END OF EXAMINERS' REPORT