# Subject SA5 — Finance
# Specialist Applications

# October 2009

# 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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**Comments for individual questions are given with the solutions that follow.**

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1

(i)

- The portfolio is $X(S - hF)$
- where $X$ is a suitable scaling factor such that $XS$ is the value of the asset
- $h$ is the hedge ratio, being the number of units of $F$ held per unit of $S$
- Change in portfolio value is $\Delta S - h\Delta F$
- Variance of linear combination of variables
- $X(aY + bZ)$ is $X^2$ $(a^2\text{VAR}[Y] + b^2\text{VAR}[Z] + 2ab\text{COV}[Y,Z])$
- so here $v = X^2$ $(\sigma^2 S + h^2\sigma^2 F - 2h\text{COV}[S,F])$
- $v = X^2$ $(\sigma^2 S + h^2\sigma^2 F - 2h\,\rho\,\sigma_S\,\sigma_F)$

(ii)

- Minimum variance occurs when $\delta v/\delta h = 0$
- $\delta v/\delta h = X^2$ $(2h\sigma^2_F - 2\,\rho\sigma_S\sigma_F)$
- Setting equal to zero and noting that $\delta^2 v/\delta h^2$ is positive the value of $h$ that minimizes the variance is
- $h = \rho\,\sigma_S / \sigma_F$ as required

(iii)

- Distressed bonds will be illiquid and / or hard to value
- Computing standard deviation may be meaningless
- Distribution of distressed returns may not be normal, which is assumed in Black-Scholes formula
- Past returns of distressed security may be wholly unrepresentative for the future

(iv) Investment risks

- Liquidity (of underlying securities): the distressed bonds are likely to be sub-investment grade, certain investors not allowed to own them so smaller pool of buyers
- Liquidity (offered to clients): quarterly redemptions not matched by portfolio's available security liquidity
- Concentrated portfolio: small team and time-consuming work means few positions; $\Rightarrow$ potentially volatile portfolio outcomes

- Volatility: recovery from individual bond can easily range from zero to par
- Interest rate risk: bonds represent long interest rate exposure
- Credit risk: holding junk-rated corporate bonds
- Mismatching risk: hedge will likely between probable short Treasuries or corporate bonds index and long distressed securities
- Clients withdraw assets while re-organisation underway: RockSolid loses influence with company as bonds must be sold
- Volatility; distressed security price changes will be more volatile than many other types of securities
- Valuation risk: lack of published prices or illiquidity makes regular pricing difficult

Business risks

- RockSolid does not receive any fixed fee – how to pay ongoing costs when performance is poor
- RockSolid is a small team and may suffer if any key staff leave
- Highly skill-based outcome: RockSolid's income depends on ability to successfully pick trades and / or influence management
- Investor redemptions leading to insufficient assets to support costs
- Operational risk of marking portfolio and timely valuation, leading to loss of customer goodwill
- Regulatory and reputational risk as RockSolid is very susceptible to insider trading problems because RockSolid personnel are likely to be on creditors committees for restructuring enterprises. Other forms of regulatory risk are not especially acute

(v) Investment risk mitigation

- Liquidity (of underlying securities): once invested, position will be illiquid, not much can be done; reduce impact by investing into several situations at once, to diversify portfolio and allow periodic client redemption payments or portfolio reallocations as situations mature
- Liquidity (offered to clients): change fund redemption to impose less frequent openings and / or minimum holding periods that clients will still be ok to invest (e.g. min 2 year holding)
- Interest rate risk: could hedge with short Treasuries or short corporate bonds index derivative
- Concentration risk: not many options besides growing team to allow more coverage but this will be expensive and affect firm results

- Volatility: portfolio is short vol so could have long options however these are not very well matched at all due to idiosyncratic nature of portfolio positions
- Credit risk: hedge with long CDS on same/similar company bonds although this may eliminate profits
- Mismatching: unless directly offsetting credit exposure using CDS this will always exist; however this is an important source of value-added by the manager and may not want to be hedged
- Credit risk could be mitigated through position limits / diversify portfolio
- Branch out into other product lines? (subject to competency)
- Compliance against insider trading

Business risk mitigation

- Introduce a fixed fee component, paid as a percentage of assets managed (possibly in exchange for a lower incentive fee) any fixed fee – how to pay ongoing costs when performance is poor
- Broaden staff base
- Ensure current staff knowledge is adequately captured in e.g. electronic internal databases and memos
- Introduce long-term staff incentive schemes, to retain personnel

(vi) RockSolid

- What price is applied to each corporate entity? Both firms consist primarily of intangible assets (the people) and future cashflows which depend on the people (incentive revenues) and will have little or no fixed assets.
- What has been the performance of the Lighthouse funds (as a guide to incentive revenues going forward)?
- How stable is the Lighthouse investor base?
- What stake will the RockSolid shareholders have in the combined entity?
- What liabilities / debts does Lighthouse have that RockSolid shareholders now become exposed to?
- Who will manage the combined entity?
- How will RockSolid's staff respond?
- What synergies can be gained by eliminating duplicate staff? (e.g. operations, marketing)

- How does Lighthouse's staff compensation compare with RockSolid's?
- Tax or regulatory implications of merger Investors in XYZ
- Competence of the Lighthouse team
- Lighthouse performance characteristics: leverage, valuation, etc
- Lighthouse client base and flows, to assess likely future combined portfolio / corporate outcome
- Potential changes to fund terms post merger

Investors in XYZ Capital

- Who will be managing their capital going forward? What influence will the original team from RockSolid retain?
- What is the overlap in positions between the two funds? How similar have the strategies been historically?
- What is the performance of the Lighthouse funds (as a comparison against realised XYZ returns)?
- Portfolio will become much more diversified due to doubling in size and inheriting Lighthouse's positions – how will this affect future volatility of outcomes?
- Will there be a change in fund terms after the merger (liquidity, fees?)
- Will the portfolio focus change to more large-cap/more liquid situations?

(vii)

- Unclear pricing of collateral: the distressed bonds are highly illiquid, possibly unlisted, may not have a regular or reliable price
- Bank will want to introduce significant margin / haircut when placing value on collateral
- Value of collateral could fall rapidly if an issuer's distress worsens
- If collateral seized, how to realize value? Bonds will be illiquid and traded among specialists only.
- If collateral seized, the bank could become unwilling party to the bankruptcy creditors' process
- Any fund investor redemptions would reduce available fund equity to post as collateral

*Many candidates scored badly on question 1 because they failed to appreciate that the company managing the fund and the fund itself have different owners. They will face different risks and have different concerns in the event of a merger with another fund manager.*

2

(i) AIFA is contemplating responding to a supply side problem in the insurance market. Not only have premiums risen dramatically but some of AIFA's member firms could be forced to cease trading if they cannot get insurance.

- AIFA needs to consider how long the high prices and lack of capacity will remain. CM may not be worth starting if the market correction is expected in the near term.
- Other non-PII insurers may also be considering entering the market to take advantage of the high premiums. If so, this could remove the need for CM.
- CM may fill a short term demand need from AIFA's members. AIFA needs to consider if CM can satisfy a need over the longer term. For example, can CM operate on a relatively low expense ratio or offer wider coverage terms.
- AIFA needs to consider how it will manage CM including underwriting, administration and advertising. AIFA will not currently employ insurance industry experts.
- AIFA should consider if there are any alternatives to commencing CM. For example, is it possible for AIFA to agree preferential terms and capacity with an existing insurer (joint venture).
- AIFA should consider the likely take up rate amongst its members. Members who are able to get cover elsewhere may be willing to pay the higher premiums in order to maintain their relationship with their existing insurer.
- AIFA needs to consider CM's pricing structure both in the near term while rates are very high and in the longer run.
- AIFA needs to consider how it will fund the initial capital and set up costs. AIFA may have some surplus funds. It may need to secure capital from a third party. In addition, through CM, AIFA will have access to the reinsurance market.
- AIFA needs to consider CM's long term potential. For example, AIFA may consider that CM could be priced out of the market. In this case AIFA would need to consider its options for selling CM or for running it off.

(ii) The business model assumes a relatively small number of insurance contracts will be written. As all of the potential insureds are already member firms of AIFA, AIFA may well already know much of the underwriting information necessary. Clearly it will be easy for AIFA to market CM to its members.

CM will be a small insurer. It must be able to operate efficiently. The underwriting system must be able to cope with a range of underwriting

circumstances (e.g. IFAs with different claims experience, IFAs specialising in different advice types and in different parts of the UK).

CM will need a separate IT system to maintain separation between AIFA and CM. To keep costs down the IT system must perform the vast majority of the underwriting and administration processes.

This said it is critical that suitably trained personnel are used to recognize any short comings in the IT underwriting process.

Managers are needed for underwriting, claims, general administration, finance, marketing and IT. Additional staff may be needed and particularly in underwriting as the company grows. Advertising is a specialist expertise and is likely to be cheaper to outsource to AIFA.

AIFA should consider forming a joint venture with an insurer who is able to provide management, administration and advertising expertise.

(iii) FSA's approach to individual capital adequacy standards (ICAS) for regulated firms was applied to non-life insurers in the UK in 2004 effective 2005.

Solvency 2 has not yet been implemented by the EU. This is planned for 2012.

Compare: Both the current system and proposed Solvency 2:

- Maintain simple minimum capital requirements
- Include provision for risk based capital models
- Include provision for asset and investment risks

Contrast:

- Solvency 2 adopts a three pillar approach involving a simple rules based minimum capital requirement, extension of the standard to incorporate all of the enterprise risks and information to customers. ICAS is a single risk-based capital framework.
- Solvency 2 allows companies to use a standard model rather than develop their own risk based capital model
- Solvency 2 requires solvency results to be published whereas the FSA requires that ICG results be kept confidential
- Solvency 2 appears to seek to include provision for all of the risks the company. It appears to be requiring companies to implement certain internal controls and risk management practices instead of simply requiring them to hold additional capital if they choose to not implement the controls.
- The current system introduces the concept of the ICG being the FSA's view of appropriate capital levels. In contrast, Solvency 2 simply approves or rejects the company's view.

(iv) Exposure: Calculate the number of IFAs taking up the PII

- The average of 1,2 and 3 is 2. Assume each of the small member firms taking up insurance has 2 IFAs.
- Assume that the most common and best way of pricing the insurance (and calculating the exposure) is per IFA.
- The capital requirement should be stress tested for different take up rates but for now assume that 30% of member firms take up the insurance.
- .3*230*2+.3*20*50 = 438 IFAs

Calculate the Premium Income

- Assume that in order to entice member firms to switch to CM, CM decides to charge each IFA £1,500 rather than the market price of £2,000. Hence the total premium income net of expenses of £200 per IFA equals £569,400.

Calculate the Claims Cost at the $99.5^{th}$ percentile

- Assume that the average small claim is £5,000 being one-half of £10,000. As the per claim limit is £1m, the implied average claim per IFA equals .995*5000+.005*1000000=9975 (overstatement because the aggregate limit will reduce many £1m claims)
- Assume that all claims are independent from one another.
- The mean aggregate claims cost equals

438*9975*.07=305,834

- The standard deviation of the aggregate claims cost distribution equals 0.3 of the mean or

.3*305,834=91750

- The $99.5^{th}$ percentile of the aggregate claims cost distribution equals

3.5*91750+305834=626,960

- These numbers do not allow for discounting (the time value of money). Assume that on average claims are paid with a delay of one year and that moneys can earn 5% p.a. prior to payment. Hence the discounted $99.5^{th}$ percentile of the aggregate claims cost equals

626,960/1.05=597,104

Calculate the difference between Income and Outgo at the 99.5 percentile

- If all premiums were received at the outset then CM would hold £569,400 net of expenses which would be available to meet claims. Hence, the capital requirement for CM at the outset would be equal to

597104–569400=£27,704.

Whilst theoretically sufficient, initial capital of £28,000 will not be acceptable to the FSA on its own because:

1. There are no guarantees that the £569,400 of net premium will actually be received.

2. Claims might be due to be paid prior to receipt of the bulk of the premiums.

3. There exists a theoretical chance of one or more £1m claims and the total capitalisation of CM is only £597,104.

4. The actual take up rate might be far higher than expected making £597,104 insufficient (obviously held premium reserves would increase to at least in part compensate).

5. The capital calculations are predicated on several assumptions, some of which may be incorrect.

In practical terms the FSA is likely to require CM to hold sufficient capital to cover at least two or three large claims implying a minimum capital requirement of either £2m or £3m.

(v) Systemic losses mean that the assumption that claims are independent from one another is not correct. In order to test this assumption it would be necessary to conduct a survey of a random selection of claims to determine whether they are related in any way.

Assuming that the factor of 3.5 standard deviations to reach the $99.5^{th}$ percentile of the aggregate claims cost distribution was made assuming that claims were independent from one another then it would be necessary to develop the assumption to allow for positive correlation between claims and possibly very strong positive correlation in the extreme cases.

(vi) A UK tax resident insurance company is subject to corporation tax on its worldwide profits. Profits are determined in the normal way, namely, revenues less allowable expenses calculated on an accrued basis during the tax year. For this purpose interest on debt is an allowable expense and premium income is pro-rated between tax years to derive the correct accrued revenues. Insurance companies are treated as traders with respect to investment income meaning that corporation tax is paid on all net investment profits.

In contrast mutual insurers are considered to be conducting a mutual trade. Profits and losses from a mutual trade are tax exempt. Hence, underwriting profits and losses are exempt from tax and expenses are not tax deductible. Investment return is taxed independently in line with the tax treatment for an insurance company.

(vii) The likely minimum capital of say £2m is very high relative to the assumed expected profitability of the premium being £306,600 or say 15%. This position is likely to worsen as market prices return to normal. For example, if

profitability returned to that of previous years then it would fall to £87,600 or 4.4%.

- With only 250 member firms, AIFA is unlikely to have access to £2m of available surplus.
- Bank debt is unlikely to be treated as being capital by the FSA. Further, the interest cost may not be tax deductible.
- Subordinated short term or long term debt may be available from the capital markets. This debt may be treated as being capital by the FSA. This said, its interest cost may not be tax deductible. Even if it were, there is unlikely to be any taxable profits to offset the interest cost against. Finally, the subordinated debt investors are likely to require that the debt be rated which will be difficult and expensive for such a small issue.
- Hence, AIFA is likely to have to rely on a combination of available surplus from it and perhaps from some of its larger members together with reinsurance to capitalise the company. Whilst reinsurance is not strictly capital the FSA is likely to reduce the required capital by the amount of reinsurance obtained.
- AIFA should discuss with the FSA the possibility of a tiered capital structure. For example the initial capital might be set at £1m whilst the number of insured IFAs stays below 250 and then increase to say £1.5m or £2m. This could reduce some of the strain of raising the initial capital.
- The initial sponsor capital might be provided on a quasi debt basis to be repaid as profits allow. This places more stress on the model as the premiums will need to provide capital returns and build up retained profits to replace the capital.

(i) Option to grow the company and to make follow on investments.

- Agree with the FSA to provide capital which increases as the number of IFA insureds increases.
- Increase the range of insurance products offered to improve the economies of scale
- Increase the number of insureds by offering the PII insurance to non-AIFA members to improve the economies of scale.

Option to abandon the new company.

- As market conditions return to normal either sell CM or cease writing new business.

Option to vary the company's production methods.

- Increase the range of services outsourced or bring them in-house depending on efficiencies.
- Increase/decrease the extent and type of reinsurance protection to change the net size of CM.

- Enter into co-insurance arrangements with other PII insurers to reduce the net size of CM.
- Demutualise to get access to equity capital in the share market.

Binomial method of risk-neutral assessment as the options are likely to be associated with a series of finite, discrete steps. Add "if-then" optionality to the financial model.

*Many candidates scored badly on question 2 because they were unable to demonstrate that they had understood the discussion in the core reading regarding the FSA's capital adequacy regime for non-life insurers. Also, many candidates had not understood the discussion of the taxation of mutual insurers in the core reading. Pleasingly many candidates were able to make relatively reasonable assumptions which were needed to calculate the new insurer's likely initial capital requirement.*

**END OF EXAMINERS' REPORT**