INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

April 2013 examinations

Subject SA5 – Finance
Specialist Applications

Introduction

The Examiners' Report is written by the Principal Examiner with the aim of helping candidates, both those who are sitting the examination for the first time and using past papers as a revision aid and also those who have previously failed the subject.

The Examiners are charged by Council with examining the published syllabus. The Examiners have access to the Core Reading, which is designed to interpret the syllabus, and will generally base questions around it but are not required to examine the content of Core Reading specifically or exclusively.

For numerical questions the Examiners' preferred approach to the solution is reproduced in this report; other valid approaches are given appropriate credit. For essay-style questions, particularly the open-ended questions in the later subjects, the report may contain more points than the Examiners will expect from a solution that scores full marks.

The report is written based on the legislative and regulatory context pertaining to the date that the examination was set. Candidates should take into account the possibility that circumstances may have changed if using these reports for revision.

D C Bowie
Chairman of the Board of Examiners

July 2013

General comments on Subject SA5

The SA5 exam generally requires bullet point form or short form essay style answers that apply general principles to directly address specific circumstances. The answers given below are just one possible set of acceptable answers. Candidates are awarded marks for all reasonable answers including different but still reasonable numerical solutions. Marks are awarded for working in the case of numerical answers.

In this paper, as with previous SA5 papers, marks are earned by stating correct points. Examples of points are stating a valued type of risk, describing the type of risk or calculating a quantity correct. Valid points need to be directly relevant to the question asked and be made coherently.

Comments on the April 2013 paper

Both questions were based on relatively common place circumstances. Question 1 focussed on how relatively small companies finance themselves. Question 2 focussed on how private equity fund managers assess potential acquisitions.

The answers to both questions were quite widely spread across the syllabus and the core reading. Some candidates appeared to have difficulty putting several different parts of the core reading into a single answer. These candidates would no doubt benefit from more practice with past papers and more frequently reading the financial press. The resulting improved depth of understanding of the application of finance in practical situations will make some questions much easier to answer.

The SA subjects are the last subjects in the sequence of formal actuarial exams. Candidates taking SA5 are expected to have at least a basic knowledge of how businesses such as banks, life insurance and general insurance companies function.

Well-prepared candidates scored acceptably well across the whole paper. The comments that follow the questions concentrate on areas where candidates could have improved their performance.

1 (i) Purchasing the swap would allow the business to remove interest rate risk from the loan and convert to a series of fixed payments.

GE is taking on some credit risk as payment may not be received if the swap moves in GE's favour (i.e. LIBOR increases).

GE will be taking on some operational risk as GE will need to deal with an unfamiliar financial transaction which may not be appropriate.

GE should ask:

- What are the fees of the transaction?
- How is the agreement protected against default?
- What is the fixed interest rate you will pay and how does that compare to alternative rates available in the market?
- What is the term of the swap and does it match your loan payments? Does the frequency of payments match the frequency of the loan payments?
- Can the swap position be closed out at your option if you are able to repay the loan?
- Is the swap tradable?

(ii) Profit should become more stable because GE has removed volatility from the balance sheet.

However, GE has traded away any potential upside from lower interest rates.

There may be expenses to cover.

Tax is payable on trading profits investment proceeds from derivatives.

This will apply on realised gains only.

Derivative proceeds are taxed as capital gains.

(iii) GE can control or limit the amount of energy released by the hazard in the first place.

In this instance, that would mean preventing the amount of damage possible by the cork exploding.

This could be achieved by:

- Automating the process by using machinery to fasten the cork in place, or use an alternative bottle stopper i.e. a screw top. This prevents the hazard, to human operators, from occurring.

- It also prevents the release of the hazard that already exists,

- Reduce the pressure in the bottles, if this is possible without affecting the product, at the point the cork is fastened. This reduces the amount of hazard.

Secondly, GE can protect the persons or property from the energy that is released. In this instance it would mean:

- Some form of barrier between the cork and the operator.

- A different material for the cork that causes less damage if it hits the operator.

- Angling the bottle in a different way so that the energy is directed away from the operator.

Finally, GE can mitigate the effects of the energy on the operator.

This can be achieved through:

- Ensuring that proper first aid facilities are available should injury occur.

- Ensure all staff are first aid trained so that an injuries can be dealt with promptly.

- Have regular training on the machine.

- Ensure that proper safety equipment is worn. Upgrade the current safety equipment to further protect the employees.

- Regular checks are held to test that safety procedures are being followed.

- Ensure appropriate insurance is in place so that rehabilitation can be paid for should an accident reoccur. This might include medical cover for the individuals operating the machine.

(iv) To model the capital required to provide for a future occurrence(s) GE could construct a frequency-severity model.

The frequency of the accident would be modelled using a discrete time distribution.

The severity of the model would be calculated by determining the impact of an accident at *n* data points where *n* is the number of parameters of the distribution used to model severity.

For example, a lognormal distribution would require two events modelled, which may be the mean case and a worst case.

The distribution used for the severity would need to have a fat enough tail to allow appropriately for a worst case.

It would be appropriate to model the amounts net and gross of any insurance held in order to understand the amount of the risk mitigation in place.

To determine the combined distribution a Monte-Carlo method would be used to perform a number of simulations.

The combined distribution could then be used to determine the impact at the desired level of probability.

If this risk is being incorporated into an entire risk model for the business an appropriate method aggregating this risk with the other risks would need to be determined.

For example, a correlation matrix could be used, or a copula.

(v) Assume:

- Lease payments occur at the start of the period.
- Discount rate used is 4%.
- The tax impact is the same for both the leasing option and the purchase option. That is the tax deductions for the interest is the same and the company cannot utilise the tax deduction of the capital depreciation.
- The discount rate is equivalent to the gross interest rate payable on the loan needed to raise the money to purchase the asset.

Then present value of payments = £347,242

Payments	75,000	75,000	75,000	75,000	75,000
Discount	1.00	0.96	0.92	0.89	0.85
	75,000	72,115	69,342	66,675	64,110
Total	**347,242**				

Compare that with the cost of buying and maintaining the machine.

Assume maintenance costs are 10% of the machine cost per annum.

Assume that maintenance costs occur halfway through the year on average.

Assume residual value at the end of the period is 25% of the purchase cost.

Then cost of purchasing the machine and running it over the same period is £249,704.

Year	*1*	*2*	*3*	*4*	*5*	*6*
Purchase	**200,000**					
Sale price at end of lease						(50,000)
Discounted sale price (start of year 6)						**(41,096)**
Maintenance costs	20,000	20,000	20,000	20,000	20,000	
Discount rate for maintenance costs	0.98	0.94	0.91	0.87	0.84	
Discounted maintenance costs	**19,612**	**18,857**	**18,132**	**17,435**	**16,764**	
Total	**249,704**					

On this basis the purchase of the asset seems to offer the best option.

A purchase is likely to be funded by borrowing. Interest payments on borrowing can qualify for tax relief, which adds to the attraction of going the purchase route.

However, the operational lease provides the option to cancel before the 5-year period has expired. The equivalent with the purchase is that the asset could be sold at any time.

The difference in value then needs to be balanced against the value of the option to cancel.

(vi) A credit score for GE may be obtained by:

- Approaching a commercial provider of credit scoring.
- They may use an internal measure (usually secret) to assess your credit worthiness.
- An example of this approach was to use the Altman Z score.
- Applying ratios to data from your published accounts i.e. the quick ratio or the current ratio
- A credit rating may be available on debt that GE has already issued.
- and the yield can be compared to similar companies to get a market view on your credit worthiness.

(vii) The retail bank will offer:

Overdrafts and loans. Expansion will likely require further financing which the bank may be willing to extend to GE.

Leasing and hire purchase. The bank may be willing to help GE with an operational lease if GE chooses to purchase the machine that way.

Export and import financing facilities. Given the international nature of GE's business these may be important for importing/exporting goods and products that GE needs and creates.

International financial transfers. Useful for moving funds between GE's English and French operations.

Not helpful for the expansion plans but GE may already be using:

- Cash management schemes
- Electronic banking
- Payroll services
- Financial Management Advice

(viii) GE may want to hedge foreign currency movements between the Euro and Sterling.

A wholesale bank will be able to provide a derivative (for example a currency swap or other instrument) to achieve this.

A wholesale bank could help with a debt issue.

GE may be able to obtain a lower rate of interest by issuing debt rather than raising finance through a bank.

(ix) The current government expects to continue to focus on repaying France's deficit. It plans to do this by increasing taxes.

Whilst this is focussed on large companies, GE will need to consider whether profits that are taxable in France will be affected by potential increases in the corporation tax rate.

The current government contemplated creating a bank to offer small and medium sized companies access to finance as way to help the competiveness of France's businesses.

If GE is eligible this could be an effective way of funding expansion.
The instability in the Eurozone caused by the debt crisis is causing volatility in the exchange rate between the euro and sterling.

This will affect any transactions where money moves across borders, for example if profits are repatriated to the UK to be paid as dividends.

Inflation is expected to remain low, as is salary inflation.

This means that the cost of labour and any resources purchased in France are also expected to remain stable over the medium term.

(x) The MD has been the key figure in making the business a success and therefore the MD's intention to retire should be disclosed as it will affect the share price.

It will need to be disclosed as soon as possible.

The MD should not withhold the information in order to get a better price for his own share sale.

The MD's son should not take advantage of the information to sell early.

The MD will need to disclose the share trade that he has made.

Retiring from the business and becoming an independent shareholder means that the MD is no longer required to be on the list of individuals with insider information.

Part (i) – Many candidates scored full or near full marks for this question.

Part (ii) – The question was handled well by most. Almost all candidates made the first two points in the above answer but many made no further points.

Part (iii) – The question was handled well by most.

Part (iv) – Candidates either found this question straightforward or very difficult. Some candidates failed to score marks because, whilst they discussed operational risk capital, they did not describe its calculation. As ever, marks were given for other reasonable answers.

Part (v) – Many candidates could have scored higher if they had included their assumptions in their answer. A significant minority of candidates were not able to calculate the cost of the lease. It is often the case that the relative attractiveness of leasing versus buying is determined by the relative value of the capital depreciation tax allowance to the financer and the borrower.

Part (vi) – This question was poorly answered by many candidates.

Part (vii) – A straight forward book work question that was well handled by most.

Part (viii) – A straight forward book work question that was well handled by most.

Part (ix) – Several candidates scored full or near full marks for this question.

Part (x) – Most candidates scored some marks for the question as they were able to discuss the disclosure issues. Few candidates were able to make further points.

2 (i) (a) Planut could buy shares in the open market. This is known as greenmail. If its future bid is contested and it loses to a rival bidder then the value of the greenmail shares is likely to have increased. If Planut is successful in a future bid then it is likely that the greenmail shares will have been purchased more cheaply than the shares purchased as the shares purchased later will contain a control premium.

(b) The market regulator is likely to require that:

1. Planut publicly declares its holding once it has reached a threshold of between 3% and 5% of the issued shares.

2. Planut temporarily cease buying shares in the open market once its holding has reached circa 15% of the issued shares.

3. Planut cannot own more than 30% of the issued shares without making a formal offer to buy all of the shares.

(c) Assume that Planut builds up a stake of 5% at £2.80 per share compared with the £3.50 it plans to bid for the company. Planut's gross profit from this action is £0.7*5m = £3.5m

(ii) Shareholder's equity per share is £4 meaning that the shares could be worth £4 in a break up scenario. In addition other insurance companies would pay for the renewal rights to future business. Permacover is long established and its brand, expertise and infrastructure should carry significant value.

(iii) Permacover's two options are to:

1. Attempt to get its stock revalued in the market by publishing action plans to immediately increase its projected return on equity. This will reduce its attractiveness to Planut.

2. Try to find a management friendly investor known as a white knight to build up a stake in Permacover and/or launch a takeover bid.

(iv)
1. The minimum regulatory requirements for the planned level of activity (with a small margin for error).

2. The requirements of the credit rating agencies (to maintain the desired rating).

3. The internal assessment of the riskiness of the activities to be undertaken.

(v) Valuation of assets – All investments in cash so no valuation issues.

Valuation of technical provisions – Undiscounted. Discounting will partly offset the premium to transfer to a third party. Assume a 10% premium to held undiscounted reserves.

Other liabilities – Assume none.

SCR – as the investments are in cash there is no market risk.

Assume no foreign exchange risk.

No health or life risks.

Default Risk – The anticipated reinsurance recoveries total £10m. The modelled default risk is likely to be immaterial.
The company is long established. Operational risk is assumed to be small.

The SCR is being driven by the premium reserve risk. The net unearned premium reserve is £125m. The risks are well spread by type, insured and location albeit the UK concentration.

(vi) The current capital is £400m. Assume 10% of £375m for the held undiscounted reserves. That leaves £362.5m for the SCR.

The BSCR calculation is the aggregate of the standard prescribed stress tests or factors including prescribed correlation matrices. Assume there are no life or health risks. As the investments are in cash there is no market risk. Assume there is no significant counterparty default risk or operational risk.

This leaves 362.5m of capital to cover the premium risk on 125m of unearned premium. The SCR capital requirement arising from the premium risk stress test is likely to be much less than 125m. Permacover is likely to have surplus regulatory capital.

(vii) Selling online/direct especially to small and medium sized enterprises.

Outsourcing could possibly save money

Reduce staff and office costs. For example, increase workloads, use IT more effectively, remove unnecessary work.

Negotiate lower commissions with introducing brokers.

(viii) The success of the growth is uncertain both in terms of the quantum of new business and the profitability. Hence, it adds risk to the transaction.

The drive for new business is likely to increase costs in the short term and the eventual gains may not be realised before the expiry of the three year hold period.

Much of the growth may come from new areas which increases the operational risk.

Likely to reduce the ability to reduce expenses and reduce capital to generate returns. May also impact the amount of leverage depending on how the expansion is viewed by the lenders. But the increase in size should increase the profits from investment returns. Also, the growth story should help the eventual sale to the future owners and hence the sale price multiple.

(ix) (a) The risks that the new investment policy would create or change.

Foreign exchange risks. The creation of three currency buckets adds considerable risk. All of the £500m of claims are likely to be in GBP and the shareholders equity would normally be protecting against adverse development in the claims and so in the same currency as the claims.
Liquidity risk. The cash is not duration matched to the claims but it is immediately available to meet claims. The investments need to be purchased to mature prior to the future claim payments. If not then there is a risk that the investments cannot be sold at the prevailing market price.

Reinvestment risk. If higher return assumptions are being used in the capital modelling then the reinvestment risk increases.

Default risk. The counterparty default risk being the probability of default and the loss given default needs to be modelled and reported to management.

Operational risk. Permacover has no expertise for making these investments and will be relying on new recruits and or outsourcing which increases the risk of loss.

(b) Consequences of the new investment policy.

Regulatory capital. The increased market risk and credit risk should be reflected in the capital charge. The liquidity risk and reinvestment risk will also have a second order charge.

Regulator oversight. Discomfort with the new policy.

Rating agencies concerns.

Management and board of directors not understanding the investments and breaching governance duties.

Volatilities in earnings due to mark to market valuations in the financial accounts.

Difficulty in marking to market and being required to mark to model.

Potential correlation with liabilities.

Need to consider hedging strategies and potential derivative trades.

Funds management costs and expertise. In house and outsourcing.

(x) **External debt raised by Planut at the holding company level**

Probably three year term.

May be amortising from Permacover's free cash flow or three year bullet repayment.

Most likely raised from a bank or a syndicate of banks.
Planut is a very large fund manager and will have access to relatively cheap debt from banks and other debt lenders.

The debt could be fixed or floating rate and would likely cost around say 4% to 6% per annum.

The debt lender may place constraints on Permacover such as investment constraints, no debt, minimum shareholders funds.

The improvement in the transaction return will depend mainly on the amount borrowed and the interest rate including the up front costs if any. If Planut was making 15% per annum on unleveraged equity and could leverage at 50% at an interest rate of 6% and a 25% tax rate then Planut's leveraged return would be 25.5% per annum (.15 + (.15/.75 – .06) * .75)

Internal Debt Raised by Permacover

Permacover could raise debt that the regulators and rating agencies were willing to treat as equity.

The debt would be subordinated debt of sufficiently long term.

The debt would likely contain options to postpone coupon payments without default.

The terms and conditions would not be very onerous in order to be treated as quasi equity. They might include things such as the immediate repayment of the debt in the case of changing country of domicile or changing nature of business.

The interest rate is likely to be much higher reflecting the term and the risk. Say twice the cost of the short term bank debt.

The improvement in the transaction return will depend mainly on the amount borrowed and the interest rate including the up front costs if any. If Planut was making 15% per annum on unleveraged equity and could leverage at 50% at an interest rate of 12% and a 25% tax rate then Planut's leveraged return would be 21% per annum (.15 + (.15/.75 – .12) * .75)

(xi) The price per share paid. There will be a control premium to the £2.80 share price. Planut already owns a small number of shares.

The assumed exit price. A better performing company may trade at a premium to book value.

The timing of the assumed exit.

The acquisition and sale transaction costs.
Permacover's current tax rate appears to be 25% as profit before tax was 40m, shareholders' equity is 400m and the ROE was 7.5%.

The adequacy of the net technical provisions. The unearned premium provision will often include expected future unearned profit.

(xii) Yes, the transaction can be successful. The £3.50 offer is 25% more than the current share price and they are widely held.

Assuming Permacover does not attempt to grow its business significantly then:

1. Potential to take out capital. Assume Planut can take out £125m post acquisition.

2. Purchase price £350m less the £125m capital release equals £225m net purchase price.

3. Ignore the small profit made by buying a small holding at £2.80.

4. Leverage the investment 50% making Planut's net investment £112.5m. Assume the cost of the £112.5m leverage is 6% or £6.75m per annum.

5. Assume a 5% savings in acquisition costs and administration expenses. Results in annual increase in pre-tax profit of £5m.

6. £900m of investments. Assume £125m capital released and a further £100m invested in cash to meet liquidity needs. £675m of investible funds. Assume increase in investment returns of 3% per annum. Increase in pre-tax profits of £20.25m per annum.

7. Total increase in pre-tax profit is 5 + 20.25 – 6.75 = £18.5m making total pre-tax profit £58.5m each year on equity capital of £112.5m.

8. From financial information, profit (40) divided by shareholders equity (100) implies 10% gross return on equity compared 7.5% quoted suggesting the corporation tax rate is 25%.

9. Post tax profit £58.5m times 0.75 = £43.9m per annum.

10. If Planut distributes the entire profit each year and sells the company at the same price then its return on equity will be 43.9/112.5 = 39% per annum.

11. The return is likely to be higher as Planut would be looking to sell the improved company for book value or more.

Planut would not significantly increase Permacover's new business if it produced lower anticipated returns over the holding period.

The achievable long run model is prob 15% per annum without debt leverage and with a less aggressive investment policy. The 20% plus returns arise from a number of relatively financially aggressive actions and from the short term opportunistic impact of buying at a discount to book and selling at a premium to book reflecting Permacover's improved efficiency and future growth.

Part (i) – This question was handled well by most candidates.

Part (ii) – The board of a public company will typically reject a bid because they believe it undervalues the company notwithstanding the current share price and/or the board believes that the bidder will be unable to complete on its bid e.g. onerous conditions and difficulties with financing.

Part (iii) – This question was handled well by most candidates.

Part (iv) – Many candidates made the first two points but not the third point.

Part (v) – This question was poorly handled by most candidates. The above points are detailed in the core reading. Their impact on Permacover can be estimated from a review of the balance sheet.

Part (vi) – This question was poorly handled by most candidates. Carrying excess capital depresses ROE and in turn generally depresses the share price. SA5 candidates should understand how regulatory capital is calculated under Solvency II and have some feeling for the numbers in the various component calculations.

Part (vii) – This question was handled well by most candidates.

Part (viii) – This question was handled well by most candidates.

Part (ix) – This question was handled well by most candidates.

Part (x) – Many candidates failed to consider raising internal debt. The discussion of raising external debt was quite good for most candidates.

Part (xi) – Candidates found this question to be quite difficult. Almost all candidates scored some marks.

Part (xii) – Candidates found this question to be quite difficult. Most candidates remembered to state with reasons whether the transaction would be successful. Many candidates were *unable to describe how Planut would (or may) be able to make its expected transaction return notwithstanding Permacover's long term record of far lower ROE.*

END OF EXAMINERS' REPORT