INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

April 2012 examinations

Subject SA5 – Finance
Specialist Applications

Purpose of Examiners' Reports

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 who are 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. Although Examiners have access to the Core Reading, which is designed to interpret the syllabus, the Examiners are not required to examine the content of Core Reading. Notwithstanding that, the questions set, and the following comments, will generally be based on Core Reading.

For numerical questions the Examiners' preferred approach to the solution is reproduced in this report. Other valid approaches are always given appropriate credit; where there is a commonly used alternative approach, this is also noted in the report. For essay-style questions, and particularly the open-ended questions in the later subjects, this report contains all the points for which the Examiners awarded marks. This is much more than a model solution – it would be impossible to write down all the points in the report in the time allowed for the question.

T J Birse
Chairman of the Board of Examiners

July 2012

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.

Comments on the April 2012 paper

As with past papers, a small number of marks required the candidate to produce numerical answers, and the majority of candidates' answers were quite poor for these questions. A great deal of actuarial work is numerical in nature and candidates should always be prepared for this type of question.

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 life insurance and general insurance at this stage in their education. Apparently this is not universally true.

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)

- Lower production costs e.g. lower cost of labour, lower cost of industrial premises
- More suitably skilled labour
- Potentially lower taxes (depends on where profits are taxed and indirect taxes, e.g. local VAT, local fuel duty)
- Closer proximity to input raw materials
- Established manufacturing facilities
- Possible better supplier quality
- Possible advantages of being closer delivery location for sale of homes to customers in other European countries
- Less regulation

Many candidates scored full or near full marks for this question.

(ii)

- As the company is based in UK will pay corporation tax on worldwide profits
- Taxable profits include trading profits and investment profits
- Main rate of CT is 26% provided profits exceed £1.5m; this is a small company so profits may be taxed at small company rate of 20% with marginal relief for profits between £300,000 and £1.5m
- Company with subsidiary companies (as is the case with this one) get to divide rate thresholds by number of companies in group + 1
- Should enjoy tax relief against cost of company's plant and machinery used in manufacture of InstaHomes

Many candidates scored full or near full marks for this question.

(iii) *Key risks:*

- Foreign exchange risk – costs in Euros, sales in Sterling
- Product, operational and technology risk – need to ensure local manufacture adheres to design specification and quality; need to oversee or manage transport and logistics remotely to ensure timely delivery of products to UK customers; determine whether homes made to order or held in stock in delivery country

Possible lower risks:

- Compliance risk – product may not meet UK standards
- Sovereign risk – depending on which country chosen, may be subject to political instability

Many candidates scored full or near full marks for this question.

(iv)

- Credit risk – customer may be unable to repay loan
- Interest rate risk – subsidiary will be acting as a bank which issues term loans and funds these using fixed or floating funding

- Liquidity risk – subsidiary may be unable to raise enough finance if demand for products is high

Many candidates scored full or near full marks for this question.

(v)

- Credit risk – mitigate through: credit underwriting of borrowers including income and expenses or balance sheet; guarantees by customers' employer(s); ensure ability to repossess InstaHome on default
- Interest rate risk – mitigate through: matching term of loans with capital market funding
- Liquidity risk – mitigate through issue of sufficient debt security to start with; mitigate by allowing further tranches of security to be issued as required

Many candidates scored full or near full marks for this question.

(vi)

- Length of loan
  - Customers may be temporary workers who may not want to be locked into a 3 year loan as their contract may finish sooner
  - Not clear what customer will do with product after the project is complete – can they resell it? Possibly to their employer? Would they want to take it with them to another construction site?
- Cost of loan
  - What interest rate (or APR) is charged on the loans
- Loans available from competing finance firms
  - Rate charged on such loans
  - Ease of taking out loan relative to current proposition
- Creditworthiness of borrower, guarantees available
  - Customers' employer may act as guarantor allowing finance subsidiary to charge lower interest rate
  - Alternately the "customer" may be the workers' employer who buys the units to house its workforce and re-uses them at future sites; the employer should get better loan terms than the individual employees
- And relative to other housing options such as renting elsewhere (although less likely due to the relatively very low cost of the home)
- Interest rate depends on subsidiary's ability to source funds in the capital market (or source from its parent company) and the expected level of operational expenses which must be covered
- The expected amount of default losses must be covered
- Ability to source funds / rate at which funds can be raised depends on:
  - Subsidiary's creditworthiness (e.g. credit rating, potential parent company guarantee)
  - Market appetite for debt securities of this kind
  - Security offered with debt securities (e.g. claim on subsidiary's assets by bondholders)
- Company's loan issue and processing expenses depends on:
  - Volume of loans

- Staff levels
- Complexity of loan process including underwriting process
- Complexity of debt collection process
- Cost of credit insurance (if any) taken out

Many candidates failed to address the main problem of the business model, namely that the relatively lowly paid workers will be employed in the project for an unknown and relatively short space of time which is likely to be too short to fully pay off the InstaHomes. Even if they could, what would the construction workers expect to be able to do with the InstaHomes at the end of the project. If these issues are properly addressed and the loan rates are reasonably competitive then the homes and the loans are likely to be a success.

(vii) *Potential alternatives:*

1. Borrow money from a bank
2. Borrow money from the parent construction co
3. Issue equity shares
4. Securitise loan portfolio

Impact on attractiveness:

1. Probably comparable to capital market; depends on volume – small volume may not be efficient to actually go to capital market in the first place
2. Probably at lower funding cost because parent could subsidise loan rate as profits made on home sales so more attractive to borrower
3. Investors may demand higher return compared to any bondholders however if equity is the only form of security issued it makes little difference as all [residual] assets belong to equityholders; indeterminate effect on relative attractiveness of loans
4. Probably similar cost because subsidiary only engages in one activity (lending) so securitisation does not really introduce any additional collateral or comfort to debt security investors

Many candidates scored well on this question.

(viii)

Sales information (start of month)					
Time	Sales	Price	Value	Repayment p.m.	Annuity factor for loans
0	10	20,000	200,000	6,933	28.8473 n = 36, i = 0.15/12
2	10	20,000	200,000	6,933	

Balance of outstanding loans at time 6 (end of 6th month)			
Loan outstandings from sales at time...			
Sale time	Outstanding	a_n	n
0	172,556	24.8889	n=30
2	181,932	26.2413	n=32
Total	354,489		

Cash flow forecast							
Cash flow from operations							
Time (months)	0	1	2	3	4	5	6
Starting cash	0	300,000	302,766	105,533	115,232	124,932	134,631
Cash from sale of debt	500,000	0	0	0	0	0	0
Loans to customes	-200,000	0	-200,000	0	0	0	
Loan repayments from customers	0	6,933	6,933	13,866	13,866	13,866	13,866
Coupons paid on debt @ 10%/12	0	-4,167	-4,167	-4,167	-4,167	-4,167	-4,167
Ending cash	300,000	302,766	105,533	115,232	124,932	134,631	144,331

Note: assumed unlent cash earns no interest

This question was very poorly answered. Most candidates made an attempt and got some marks. Candidates should practice doing cash flow questions as a part of their study for SA5.

(ix) Using calculations from (viii)

Maturity gaps	
Fixed term liabilities (debt securities outstanding)	500,000
Fixed term assets (customer loans)	354,489
Fixed term gap	145,511
Variable term liabilities (none)	0
Variable term assets (cash balance)	144,331
Variable term gap	-144,331

This question was very poorly answered as it relied on the answer above.

(x)

- Very simple measure
- Ignores market values, uses accounting values only
- Ignores duration

This question was very poorly answered as it relied in part on the answer above.

(xi)

- Company retains InstaHomes for reuse by another customer
- If several successive customers can be found for the same InstaHome, margins will increase as refurbishment of a returned home likely to be cheaper than building a new one
- Company needs to fund cost of construction upfront with no offsetting lump sum sales income; therefore imposes cash-flow drain on company

- May avoid having to issue debt in the markets, avoid creating subsidiary so overall lower admin costs
- As the workers are only temporary workers they may only want to use the homes for a period of time. Leasing the homes might unlock considerable extra demand. The returned homes might them be an attractive option for future Olympics as well as other uses.

This question was reasonably well answered by many. The candidates who understood the main issue with the business model scored best.

(xii)

- Product liability – products may cause injury to customers or require repairs to get to standard
- Potentially employee liability – units may injure staff during assembly or repair
- Reputational risk

(xiii)

- Liability insurance
- Employers liability insurance

Many candidates failed to show a basic understanding of typical general insurance products.

2 (i)

- The acquisition might be a good use of cash because Life Co is taking greater control of the distribution of its products to market.
- Keeping a significant cash balance may make Life Co a takeover target itself
- This is an example of a vertical integration
- Life Co could return its cash to its stockholders through a dividend payment.
- Therefore, the acquisition is sensible if Life Co can obtain a better return with this investment

- Merging the companies may bring efficiencies through co-ordination and administration.
- Areas where efficiencies may be sought are in:
  - IT – where merging systems, particularly vertical integration, will improve efficiency and service
  - Finance and Accounting, where it is likely that duplication of functions exist and hence rationalisation can occur
  - Legal services and Compliance where they may be overlap of the activities taken, particularly in the compliance function
  - Marketing, where the merger is likely seek to reinforce a single brand and therefore will want to achieve consistency. This will reduce the staffing overhead as the focus of the marketing will narrow.

- Life Co may consider that additional scale brings opportunity to outsource its operations, such as IT, to obtain cost savings.

- Life Co may consider that the management of MegaBrokers is poor and believes it can manage the business more effectively given its knowledge of the target market.
- However, it may not be possible to replace the management wholesale depending on the governance in place at MegaBrokers.
- In reality, Life Co management may be inexperienced in dealing with the issues MegaBrokers has faced and be unable to correct the perceived failings.

- The management of Life Co may be seeking to diversify its interests by acquiring some exposure to the general insurance market as well as some benefit from distributing competitor's products.
- Life Co might be seeking to diversify away from being a principal to being a service provider as well.
- However, stockholders may not be attracted to this aspect as they can achieve diversification more easily through their own investment strategy.
- In a well-diversified market, diversification will not add value for the stockholders.

- With larger scale, Life Co may be able to achieve lower financing costs.
- This would be achieved by offering larger volumes of securities.
- … at a lower interest rate due to the additional size of the company.
- However, lower financing costs are achieved because the two entities are now guaranteeing each other's debts.
- This leads to a lower risk premium in the valuation of debt securities.
- However, stockholders option to default has reduced in value.
- Issued bonds of MegaBrokers will gain in value due to the lower perceived risk.
- This has been paid for by the stockholders in the new combined entity.

- MegaBrokers may be making losses for a reason which the stockholders of Life Co will be forced to support.
- Part of overall strategy to move into general insurance

This was a straight-forward question that most candidates tackled well.

(ii)

- The Board of MegaBrokers could change its charter so that only a portion of the Board is able to be elected each year.
- This gives some certainty to MegaBrokers's management but has no benefit to the stockholders and may prevent them from removing inefficient management in future.

- MegaBrokers could apply restricted voting rights to shareholders that own more than a specified percentage of the stock.

- Alternatively, MegaBrokers could require that a waiting period is enforced before any acquisition can complete.
- These options are unlikely to work in the favour of any stockholder and can reduce the attractiveness of the stock if existing holders wanted to acquire more in future.

- The debt of MegaBrokers could be structured to contain a clause that requires immediate repayment of the debt if there is a hostile change of control.
- This is known as a poison put.
- Stockholders may be impacted if such a clause creates higher borrowing costs for MegaBrokers.

- Existing shareholders can be issued rights that allow them to buy additional shares at a low price if there is a significant purchase of shares by a hostile bidder.
- This is known as a poison pill.
- This action is likely to reduce the share price when it is announced.
- It may also prevent the shareholders of MegaBrokers benefitting from share price increases when an acquisition is announced that they would welcome.

- MegaBrokers could decide to buy back the shares purchased by Life Co at a higher price than Life Co paid under the stipulation that Life Co does not pursue the bid.
- This will lose value for MegaBrokers's existing shareholders.
- There may also be tax implications of such a tactic.

- MegaBrokers could acquire shares in Life Co itself.
- This could allow MegaBrokers to try and block the transaction Life Co is pursuing.
- It may also acquire assets that Life Co doesn't want or would be problematic, for example if caused asset admissibility problems for solvency purposes.
- These asset purchases may not add value for MegaBrokers's shareholders.

- MegaBrokers could look for a different purchaser or partner that it finds more attractive.
- Such an entity is often referred to as a White Knight.
- The merged entity would have an increased market capitalisation that would make it more expensive for Life Co to acquire.
- Life Co may not want the business that the White Knight brought which would make it less attractive.
- This might benefit the stockholders of MegaBrokers if the partner is more suitable and the managers of MegaBrokers fight the transaction less.
- However, if pressure to the price is applied during the transaction the stockholders of MegaBrokers may not get a good deal.

- Takeover defences in general are subject to challenge in the courts and the costs of this may be detrimental to MegaBrokers (and Life Co) shareholders.

This was a straight-forward question that most candidates tackled well.

(iii)

Share prices will be affected by:

- Both: General market movements providing they are sufficiently large to upset the relatively fixed bid price
- Both: The market's perception of the additional return generated by the proposed acquisition relative to the price paid will affect Life Co's price and reflect MegaBrokers's price in the opposite direction.
- Life Co: The relative size of the transaction to the size of MegaBrokers.
- Life Co: The loss of the prospective dividend from the cash held on Life Co's balance sheet.
- Life Co: The fit of the purchase to Life Co's business plan.
- Both: Any competition for MegaBrokers will drive up the price and make the deal worse.
- Potentially Both: May be additional costs of the transaction that are not reflected in the price.
- Both: Arbitrageurs may be attracted to the deal and drive up the share price of one (or both) companies.
- Life Co: There may be value in optionality in Life Co's business, for example tax relief it might gain by offsetting the debt payments on MegaBrokers's issued debt other income it earns.
- Both: If MegaBrokers defends the acquisition then it may destroy value in both companies due to the distraction of the acquisition and the publicity generated.

This was a straight-forward question that most candidates tackled well.

(iv)

- One way of allocating the risk-based capital is to use the VaR methodology.
- This involves calculating a Risk Adjusted Performance Measure.
- Here the measure will be defined as (Income – Expenditure – "Expected Losses") / Value at Risk.

- The addition of the MegaBrokers business brings a different risk mix into the Life Co company.
- The Value at Risk will need to be recalculated to allow for the new risks.
- The Value at Risk could be calculated for each separate entity.
- Alternatively, the VaR could be recalculated for the entire company.
- Under either method, the overall VaR is will increase the overall economic capital.

- In particular, there will be additional liquidity risk (to cover the debt payments of MegaBrokers) and operational risk (to cover mis-selling and other regulatory risks).

- However, there is likely to be greater diversification of risks.
- Therefore, a key component of the revised calculation will be to understand how the new risks diversify in the overall calculation.
- If a combined VaR is calculated then, to allocate the overall risk capital to the new company, the impact of the diversification will need to be calculated so that the risk capital for the MegaBrokers business can be grossed-up correctly.

- A second method of calculating the pre-diversification risk capital is to start by calculating an Earnings at Risk buffer.
- A return on capital is either calculated using competitor analysis or using the Capital Asset Pricing Model to establish a target rate of return.
- The return will need to be adjusted for the new company.
- For the calculation of the beta value, a lack of history for such an entity will mean that either a suitable competitor will be required or an estimate of the beta using the expected revenue will have to be carried out.
- Alternatively, each Life Co may choose to calculate the MegaBrokers earnings at risk separately. This may allow it to use historic information.
- The Earnings at Risk will then be calculated (for each business if considered separately). The earnings at risk is the earnings allowing for their historical volatility.
- The risk-capital is then calculated to be the Earnings at Risk / Risk-free rate.
- As for the RAMP method, the additional diversification of risks will need to be considered, either to add the separate Risk Capital amounts together or to enable the aggregate risk capital to be split.

This question was not well handled by most candidates. Many candidates stated two basic and reasonable approaches. Most answers were too generic and too short for 10 marks. As such they did not address the issues which were specific to the question.

(v)

- Life Co will need to construct a security whose income depends on the regular commission streams it is receiving.
- The key factor in the level of commission that it receives on a block of business will be the persistency of that business and the level of renewals.

- The company could structure the security as a multi-class security.
- The block of business to be securitised could be arranged by business type, for example Life Co and general business separately, where different persistency levels are experienced.
- The most persistent business would be allocated to a tranche that was paid first.
- The number of classes would be dependent on the number of sensible homogenous groups that could be constructed.

- Life Co would need to demonstrate that it had a credible history attaching to the level and duration of payments received for each class.
- The classes would need to take into account the liquidity and risk preferences of the target investors.

- To make the issue more attractive and to help offset risk Life Co could pay higher coupons and/or issue at a larger discount.
- It could also consider using credit enhancements, such as:
- Over-collateralisation of the issue.
- A cash collateral account to support future payments.
- A third-party guarantee.
- Subordination of the issue.

- There will be costs involved in issuing the securities.
- The price gained for the issue might be less than the true value of the payments.

Most candidates were able to offer reasonable ideas on how the securitisation could be made more attractive to the buyers.

(vi)

- Financial distress may cause MegaBrokers to take action that is not in the interest of the stockholders.
- It could consider cutting back on the breadth of its activities by focussing on either life business where it has its key interest rather than general insurance. This may compromise the level of future cash flow.

- Alternatively, it may take on a high risk project given that it feels it has nothing to lose.
- It could consider expanding the lines of business it acts as a broker for, giving rise to training and compliance risk.

- It could seek to liquidate the entire firm and return the money to its stockholders.

- It might be tempted to take shortcuts when selling to customers to drive up commissions.
- This would lead to a higher regulatory risk.

- It could cut back on advertising and marketing.
- This may lead to lower income streams and reduce name awareness. It may also lead it to lose clients who perceive it is in difficulties.

- It may cut back on staff training and development.
- This could lead to regulatory risk and mis-selling.
- It may also lead to staff leaving for companies with better training programmes.
- Asking the shareholders to inject additional equity

- Selling off parts of the business or assets, for example the general insurance brokerage business.
- Allowing debt holders to step-in, taking an equity stake and control of the business (as the loans would probably be in default and give debtholders this right).

Many candidates scored full or near full marks for this question.

END OF EXAMINERS' REPORT