

# INSTITUTE AND FACULTY OF ACTUARIES

## EXAMINERS' REPORT

September 2016

### 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.

Luke Hatter  
Chair of the Board of Examiners  
December 2016

**A. General comments on the *aims of this subject and how it is marked***

1. The aim of the Finance Specialist Applications subject is to instil in successful candidates the ability to apply knowledge of the United Kingdom financial environment and the principles of actuarial practice to the financial management of clients' affairs.
2. 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 the most suitable but are just one possible set of acceptable answers. Candidates are awarded marks for all reasonable answers including different but still reasonable numerical solutions.
3. Candidates' answers are made up of a series of points. For example, a point can be stating a valid type of risk and then another point for describing the type of risk, if so asked. The available marks give a general guide to the level of detail students' answers are expected to cover.
4. Where a question sets out a specific scenario, candidates are expected to tailor their solutions to the circumstances described. Offering a more general ("standardised") solution in a case like that would score fewer marks.
5. Candidates who give well-reasoned points, not in the marking schedule, are awarded marks for doing so.

**B. General comments on *student performance in this diet of the examination***

1. The paper covered a fairly normal range of topics, including capital management, treasury operations and capital market regulation.
2. Students appeared to find this paper slightly more difficult than previously, which is reflected in a reduced overall pass rate.
3. There was evidence of several students not reading the questions fully and giving generic answers, scoring lower marks than they might otherwise have done. For example, many students overlooked that for question 2 the company was an industrial company and offered "standard" responses to do with capital adequacy or the actions of insurance regulators which were not relevant in that situation.
4. A number of students missed out on marks by presenting solutions in unreadable handwriting.
5. This paper had no calculation sections however marks would be awarded for workings in the case of numerical answers.

### C. Pass Mark

The Pass Mark for this exam was 55.

### Solutions

**Q1** (i) core capital = shareholders' equity + disclosed reserves. [1]

[Maximum 1]

Straightforward bookwork.

- (ii)
- industry-wide standards set minimum rules that each country is expected to follow [1]
  - local regulators may have input to the global standards [½]
  - local regulators interpret industry-wide rules [½]
  - local regulators often define their own sets of minimum capital requirements [1]
  - banks must adhere to the requirements of local regulators... [½]
  - ... in territories where they operate (subject to passporting-style exemptions) [½]
  - local regulations may be more onerous than industry-wide agreements [½]
  - local regulations may reflect particular local concerns, issues or practices [½]
  - banks are therefore not actually explicitly subject to e.g. Basel II. [½]

[Maximum 3]

Relatively few students realised that banks are technically only subject to local regulations, and that local regulators need to set appropriate standards.

- (iii)
- Basel III is intended to strengthen bank capital requirements... [½]
  - ... and enhancing the stability of the global financial system [½]
  - ... by increasing bank liquidity and [reducing] bank leverage [½]  
*(NOTE: The 2016 Core Reading implies "increasing" leverage which is clearly incorrect)*
  - Minimum amount of capital therefore likely to increase as that is the intention [½]
  - Minimum solvency ratio = Regulatory Capital / Risk-Weighted Assets [½]
  - The minimum solvency ratio is increased from 2% to 7% [½]
  - ... although many national regulators already imposed higher limits than 2% so in practice banks will have held more than 2% already [½]

- ... but potentially less than 7% [½]
  - The way in which the Risk-Weighted Asset (RWA) amount is calculated has changed [½]
  - ... which increases the RWA denominator within the minimum solvency ratio calculation [½]
  - ... on average up by about 23–25% [½]
  - ... especially in the area of (proprietary) trading [½]
  - Assets eligible to count towards Regulatory Capital has become more restrictive in Basel III [½]
  - The new definition of core equity means that it is reduced... [½]
  - ... by up to 40% [½]
  - ... and disallows certain assets to be eligible e.g. intangibles... [½]
  - ... and deferred tax [½]
  - Therefore more “true“ equity will be needed to satisfy any tests [½]
- New ratios introduced:
- leverage ratio: which means that amounts of assets and commitments should not represent more than 33 times the Regulatory Capital [1]
  - liquidity coverage ratio: high-quality highly-liquid assets held must exceed the net cash outflows for the following 30 days [1]
  - net stable funding ratio: long-term financial resources exceed long-term commitments i.e. more than one year [1]

[Maximum 7]

A primarily bookwork question, with slight application. Students were expected to examine the difference between Basel II and Basel III, rather than comment on regulations generally.

(iv)

- loans extended count as assets of the bank [½]
- small and medium enterprises are more likely to default or generate more volatile repayment experience than large or sovereign borrowers [½]
- risk-weighting of loans to small and medium enterprises is therefore likely to be high [½]
- bank must hold a prescribed amount of capital against these loans (to cover possibility of excess defaults) [½]
- minimum capital requirements will be higher for these loans than for loans to larger enterprises [½]
- which therefore reduces the amount of loans that the bank can back using a given quantity of capital [½]
- Smaller loans (to smaller businesses) – all else equal – would incur higher per unit servicing expenses so this may discourage banks from making such loans [½]

- Higher capital requirements – unless matched by a compensating increase in the interest rate charged – will reduce the return on capital for lending in general, which will affect the willingness to extend loans to all size of business, including small and medium [½]

[Maximum 2]

This question was quite specific – looking only at the supply side and at the effects of capital requirements. Extraneous points did not score marks.

(v) Supply factors

- current level of interest rates that could be charged to such borrowers is not sufficient [½]
- ... relative to the bank’s cost of funding [½]
- i.e. the lending margin is insufficient [½]
- ... compared to the expected cost of defaults and capital/risk charges... [½]
- ... and the expenses incurred [½]
- ... encouraging banks to make fewer, larger loans [½]
- increased competition from other types of lender [½]
- e.g. peer-to-peer lending has grown [½]
- banks may have changed their strategy since the financial crisis [½]
- e.g. due to a change in risk appetite [½]
- ... or a focus on a different market segment [½]
- potential consolidation in the banking sector [½]
- underwriting approaches needed to be tightened following the financial crisis... [½]
- ... and banks may not feel that they have the ability to underwrite these borrowers any longer [½]
- the bank’s prior poor credit or expense experience with borrowers like this [½]
- the bank may have reduced ability to lay off excess exposures to such loans through e.g. securitisation because the market for securitisation has reduced [½]
- additional operational risk arising from the changes to underwriting processes [½]
- inadequate levels of security or collateral arrangements that the bank is able to (typically) demand from such borrowers [½]

Demand factors

- borrowers could want to borrow less, driven by reduced economic growth expectations [½]
- for example because investment returns for projects have declined [½]
- and because borrowing costs increased or at best remained same [½]
- ... or because the terms of loans are no longer suitable (e.g. as regards term, collateral, early repayment) [½]
- Borrowers may be unwilling to spend the extra management time needed for loan underwriting in a tighter loan market [½]

- Borrowers may be raising finance through other means [½]
- For example by issuing equity shares (in a bouyant market) ... [½]
- ... or (for larger firms) accessing the debt markets directly [½]
- ... or through peer-to-peer lending programmes [½]
- borrowers may be unable to meet security (e.g. guarantee or first charge) requirements [½]
- many of the enterprises to whom lending had been given may have become bankrupt or insolvent [½]
- borrowers may have reached their credit ceilings / maximum affordable loans [½]

[Maximum 7]

This was a difficult question as there are many points to be made.

Students were expected to read the question and give factors *in addition* to capital requirements as well as address only a *fall* in lending.

(vi)

- high risk loans will generate higher expected returns but require higher levels of capital; if capital is not available, these higher risk loans will not be made [1]
- management of the bank is (always) an optimisation problem: balancing the cost of obtaining funds against the expected return on those funds [1]
- risk appetite has fallen sharply so banks may simply be operating on a lower point of the risk/reward curve [1]
- banks' focus may be too short-term, ignoring the impact of exiting loans/customers now which may be unhelpful for growing the business in the long-term [½]
- banks have focused too much on the cost of obtaining new funds [½]
- ...which has been more difficult post financial crisis [½]
- rather than on improving revenues / profit by e.g. [½]
- ... better loan outcomes (e.g. through better underwriting) [½]
- ... increased price (and hence revenue) of loans made (i.e. could be willing to lend more at higher interest rates) [½]
- ... or through more value-added services (e.g. advisory work, M&A work) [½]
- interest rates tend to be sticky due to competition... [½]
- ... or unwillingness to increase rates [½]
- however, if raised, would improve the profitability of the book [½]
- banks are not properly considering the opportunity lost by not lending... [½]
- ... through demanding too high security [½]
- banks are focused entirely on balance sheet risk reduction, not judicious commercial considerations [½]

- bank regulators or rating agencies may indirectly be encouraging them to act in this way [½]

[Maximum 4]

[Total 24]

Students who recognised that managing a bank naturally involves a trade-off between the cost of raising funds and the expected return from deploying those funds were able to make useful responses.  
Several students offered no solution to this question.

## Q2

(i)

- The predator believes the sum of JKL’s parts (or separable assets) is worth more than the whole / the current market value [1]
- ... i.e. the opposite of synergy; by breaking up and selling subsidiaries to separate new owners, would realise value locked into subsidiaries [1]
- Believes the company is unwieldy and that management is struggling to run it effectively [1]
- ... breaking it up would “unshackle“ and allow them to focus on one or more parts while the remainder is sold to someone else [1]
- JKL may be a competitor to the predator, which it is now seeking to eliminate
- The predator believes it can receive high prices (higher than currently implied by market prices) for individual *assets* (as compared to entire subsidiaries) owned within the JKL group [1]
- The predator may be interested in one (or a few) lines of business/assets of the target, and not be interested in the rest (e.g. may intend to sell of unprofitable divisions) [1]
- The predator may know upfront that it will be easier to sell components of the target (i.e. easier to find buyer for individual chunks) [½]
- The predator may know that competition authorities will force a partial break up (although this is more usually a consequence of a takeover, rather than a motive for breaking the target up in the first place) [½]

[Maximum 3]

Many students overlooked that this was an *industrial* company, and failed to tailor their answers accordingly.

Also, the question specifically asks students to give reasons why the predator wants to *break up* a company post acquisition, and answers were expected to address primarily this aspect.

Students who mentioned "tax reasons" needed to explain adequately how this may be a reason for breaking the target up in order to score marks (e.g. they could argue the target has accumulated tax losses *in one division only* and the predator wants to sell off all the other divisions).

- (ii) Any two of:
- method 1: spin off subsidiaries / individually list subsidiaries [½]
    - predator would own shares in subsidiary which, when trading, are expected to be worth more than the implied value of the subsidiary within the combined company [½]
    - the predator can then sell the shares for cash to realise the gain [½]
  - method 2: sell each subsidiary as a going concern to a new owner / carve out [½]
    - JKL would receive more in sale proceeds than the carrying cost (book value or implied value) of that subsidiary [½]
    - The buyer would pay cash or some other marketable security [½]
    - JKL could distribute this cash to its shareholders (i.e. the predator) in the form of a dividend or other type of cash distribution [½]
  - method 3: sell individual assets (e.g. a building, factory, book of business, regional office etc.) to a new owner [½]
    - JKL would receive more in sale proceeds than the carrying cost (book value/implied purchase price) of that asset, i.e. profit from the difference in value [½]
    - JKL would receive cash for the sale of each asset [½]
    - JKL could distribute this cash to its shareholders (i.e. the predator) in the form of a dividend or other type of cash distribution [½]

[Maximum 3]

Few students described how value would actually be *transferred* to the predator and hence overall marks were low for this question.

A good answer would recognise that in making the acquisition, the predator buys the affected part of the target company for an implied cost of X and then sells it on for a price of Y where Y is greater than X, the difference being profit which is transferred to the predator.

- (iii)
- Does the predator have sufficient cash (or access to financing) available? [½]  
If not, how easy is it to raise the cash? i.e. at what cost and how quickly? [½]
  - What is the opportunity cost of using existing cash? (i.e. what alternative uses/projects are there? [½]  
What is the likelihood that JKL shareholders will prefer cash? What is the likelihood they will prefer shares in the predator? [½]

- Is the predator listed (i.e. do shares exist in an easy transferable format)? [½]
- The predator is foreign – does it have shares listed on the local market which it can offer to JKL shareholders? If not, can JKL shareholders receive foreign shares / can shares in the predator be issued to foreign holders? [½]
- Are there tax differences (to predator or target shareholders)? [½]
- The predators's existing shareholders may not want to dilute their holdings if new shares were issued. [½]
- Consider the expenses of either option. [½]
- Consider the likely market response to either option. [½]
- If the market is very volatile (including exchange rates if relevant), a cash offer may need to be revised frequently to avoid appearing inadequate (if prices have risen) or overly generous (if prices have fallen) [½]

[Maximum 2]

A relatively straightforward question with many marks available.

Note that some points may also be valid for question 2 part (iv) and credit would be given as appropriate even where points were made under the other sub-question.

(iv)

- Payment of cash results in transfer of resources out of predator company and to the target company's shareholders [½]
- Because this cash is removed from the merged entity, it may create pressure on management to realise the synergies of the merger more quickly / more thoroughly ... [1]
- ... as they have less surplus to shield them against delays, overruns or mistakes [½]
- ... so the market may expect benefits of the merger to be more reliably and more rapidly realised [½]
- If cash is used, the predator's shareholders may oppose this if they prefer the cash to be used for other purposes (e.g. a special dividend) [½]
- If shares were issued instead, both sets of shareholders become owners in the new merged entity and both influence its activities going forward [½]
- However the predator's shareholders would have a diluted interest in the merged entity, which they may not want (i.e. some control will be lost) [½]
- If the overall market is in a buoyant phase, an offer of shares is likely to be more attractive as they may go up in value if the market overall rises between offer date and closing date; conversely in a depressed market the target shareholders may prefer a cash offer [1]
- Payment of cash to target shareholders may be more attractive than receipt of shares to these shareholders for their own reasons (e.g. tax) ... [½]
- ... which can create net benefits even if the merger itself has only marginal economic benefits [½]

- A cash-based acquisition may fail if the money cannot be found [½]
- Cash transactions enable easier identification of “flow of benefits” from predator to target; .. [½]
- ... this can make it hard to disentangle some of the drivers of the merger’s success or failure [½]
- Acquisition for stock more equitably shares benefits and risks between both sets of shareholders, as target shareholders remain shareholders in combined entity and therefore have an interest in the success of the transaction [½]
- A cash transaction leaves the predator’s shareholders bearing all of the risks and rewards of the transaction [½]

[Maximum 4]

This was a more difficult question but students made reasonable attempts at it.

Most recognised that ownership/control of the merged entity would be affected by whether shares or cash was used and this was one useful starting point from which to gain several marks.

(v)

- Capital market regulators, including governments, will usually wish to protect the interests of existing shareholders and managers as well as the wider public interest. [1]
- Limitations can arise from the need to balance these interests. [½]
- UK is a member of the European Union [½]
- UK is also a member of the World Trade Organisation [½]
- either of these, together with existing UK law, may limit the actions the UK government is able to take [½]
- ... including EU rules on state assistance, which this transaction may be deemed to be [½]
- JKL is a listed company, not a state-owned enterprise; what laws exist to permit state intervention? [½]
- Existing legislation exists in relation to takeover activities, and this will impose limitations on the government [½]
- ... e.g. anti-monopoly legislation [½]
- The UK government is unlikely to have much direct influence over a foreign company [½]
- The UK government would be wary of setting a precedent that discourages future cross-border corporate activity [½]

- The UK government could buy shares in the company (or may be a shareholder already) however there may be limitations on how many (more) shares it could acquire before being in violation of takeover rules or being judged to have given state aid to JKL [½]

[Maximum 3]

This was relatively poorly answered although most students realised any action would need to be carried out in accordance with (existing) UK legislation which may contain many sorts of limitations.

(vi)

- SPVs and leasing transactions have the effect of transferring ownership of certain assets off the balance sheet of JKL and to an independent entity [1]
- JKL receives cash or some kind of security in return and retains right of use (possibly in exchange for an ongoing regular fee) [½]
- once completed, neither JKL nor the predator (if it were to acquire JKL) can now sell those same assets in the open market to another party for a new price [1]
- from JKL's perspective the transaction capitalises and locks in any future gains which could be had from the affected assets [½]
- if JKL receives cash this may be attractive to the predator; however if JKL receives securities in an SPV for example these may be highly illiquid and profoundly unattractive to the predator (esp. compared to the original assets) [1]
- The assets transferred to the SPV or leaseholder may be exactly the ones the predator was hoping to acquire (the crown jewels) – if these are transferred away, the predator may have little or no interest in acquiring the rest of JKL [½]

If transferred at below what the predator believes they are worth:

- any unrecognised value in those assets is now transferred from JKL to the SPV or the leaseholder [½]
- the leaseholder or SPV therefore accrues the gain... [½]
- ... leaving JKL worse off and hence less attractive to the predator [½]

If transferred at above what they are worth:

- JKL will accrue a "gain" on the sale (either explicitly through a profit in its accounts or implicitly by shareholders now increasing their calculated net asset value for JKL) [½]
- this should drive up the share price of JKL [½]

- making JKL less attractive (i.e. more expensive to acquire) to the predator [½]

[Maximum 5]

This was poorly answered.

Rather like question 2 part (ii) few students understood that these transactions would effectively involve JKL selling one thing and receiving proceeds (or something else of value) in return. The key was to compare what the before and after values would be and which party may be left with unrealised upside, and hence determine whether the action would make JKL more or less attractive as a takeover target.

(vii)

- each set of financial statements is prepared for a different purpose – running the company / making day-to-day operational and strategic decisions vs. providing (standardised) information to the market [1]
- internal data may use different accounting bases, i.e. internal is not likely to be subject to the same accounting standards as published information [½]
  - e.g. market value may be used for internal purposes vs historic cost in published statements [½]
  - e.g. internal statements may treat intangibles or depreciation very differently [½]
  - e.g. off-balance-sheet or contingent items may be treated very differently [½]
- internal information may rely much more on estimates whereas published information may need to be verified and audited [½]
- a difference could be due to deliberate misstatement / fraud / issues of creative accounting [½]
- one or the other set of numbers may be out of date [½]

[Maximum 2]

A fairly straightforward question with many students scoring full marks.

(viii)

- the regulators' primary aim is to ensure fairness among all affected shareholders of the target and, if relevant, the acquiring company [½]
- i.e. that all shareholders can act on the basis of the same information, provided at the same time, in the same degree of detail [½]
- ... and hence determine for themselves whether to agree to the takeover or not [½]
- other potential interested parties need to be alerted to the takeover and given adequate chance to make their own bids if they wish... [½]

- ... thereby affording shareholders of the target company the opportunity to consider any alternate (perhaps more valuable) offers [½]
- the takeover will therefore usually include a strict timetable and potentially prescribed content for divulging information related to the bid [½]
- ... including any stakes built up by predator or others [½]
- ... and deadlines by which other bidders must declare themselves [½]
- a bidder may have limited time to complete takeover to ensure no lingering incomplete bids remain, which create market uncertainty [½]
- this may include preventing new bids within a certain period, to ensure that bids, when made, are genuine [½]

[Maximum 3]

[Total 25]

Another easier question with many students scoring well.

Many students answered with the full set of UK takeover guidelines (e.g. ownership declaration percentages, etc.). While marks were available for some of this, the question was aimed at a more conceptual level and students would have been better advised to write less detail about the Code but instead consider wider points.

**Q3** (i)

- The first restriction will be the solvency ratio of the company. [1]
- A regulator may place restrictions on the amount of dividend that can be paid even if statutory solvency isn't breached [½]
- The Board is also likely to have set a risk appetite that maintains a buffer over the regulatory level of solvency which will again restrict the amount of dividend. [½]
- A further consideration is liquidity. [1]
- The solvency position will take credit for future profits which are not liquid (unless they have been securitised). [½]
- Other assets that are part of the solvency surplus may also be illiquid. [½]
- The company may need liquidity to pay future claims, expenses or committed project costs. [½]
- Differential taxes on profits, dividends and capital gains may influence the maximum appropriate dividend. [1]
- There may be restrictions placed on the level of the dividend by existing bondholders to make sure they get paid. [1]
- Opportunity cost: the company may want to retain profits to reinvest in the company which would restrict the dividend. [½]
- The insurer will also have regard to the dividend it paid previously... [½]
- ... and its target dividend ratio. [½]
- Therefore, the current year's profits (and possibly prior year's) will be part of the maximum dividend consideration. [½]

- Shareholder expectations need to be taken into consideration. [½]
- A step change in profitability could cause the dividend to be reassessed from its smoothed target position. [½]
- However, most companies avoid having to declare a drop in dividend... [½]
- ... so the projected future profits will also be taken into account. [½]
- The behaviour of its peer companies would be considered. [½]
- And the extent to which investors are influenced by dividend policy within that particular market [½]
- There may be future regulatory changes ahead that means the company needs to preserve its solvency base. [½]
- Shareholder preferences may be considered (e.g. for capital gains/buybacks vs dividends) [½]

[Maximum 7]

A fairly typical question, answered satisfactorily by most students.

Students were expected to comment on maximum dividend payable, not dividend policy in general.

(ii)

- The Modigliani - Miller proposition states that the share price should not be affected by whether the dividend is paid or retained as profit within the company ... [1]
- ... as long as taxes, transaction costs and market imperfections are ignored. [½]
- Hence, according to this principle, the share price should be unaffected by the company's decision. [½]
- The price reaction will be significantly affected by shareholder expectations – i.e. what shareholders have been led to expect and whether the new value is higher or lower than this [1]
- However, certain classes of shareholder may rely on dividend income or prefer high income stocks for other reasons. [½]
- High dividends could be seen as a sign of confidence or as a sign that the business has matured. [½]
- Particularly if the dividend has fallen, investors may choose to seek to sell this stock and seek one with higher income. This could lead the stock price to fall. [½]
- However, the company may be seeking to retain earnings (rather than pay dividends) to invest in future projects [½]

- If this is communicated, and the return on the project can be seen to increase shareholder value, the share price may increase. [1]

[Maximum 3]

Students who were able to relate this question to Modigliani-Miller – either literally or by recalling the proposition's result - found themselves at an advantage.

(iii)

- The insurer could attempt to find a buyer for the mortgages. [1]
- The buyer would offer cash or some other marketable securities [½]
- The insurer could attempt to securitise the assets. [1]
- It could do this by transferring the assets to a special purpose vehicle that converts the loans into one or more tranches with different certainties of coupons being paid. [½]
- The insurer could organise a credit arrangement with a bank using the loans as collateral subject to the assets meeting the bank's collateral terms. [1]
- This could take the form of lines of credit or a revolving credit facility. [½]
- The insurer could alter the terms of the product to permit (or even better require) periodic repayments - may need to offer an incentive for customers to switch however... [1]
- ... which would result in inflows into the insurer's treasury [½]

[Maximum 3]

There was a subtlety in this question that was missed by many students, being that an asset's duration/term may say very little about its liquidity. For example, a long-duration zero coupon government bond may provide no cashflows during its lifetime but may nevertheless be highly liquid if there is an active secondary market for this bond. Improving liquidity could therefore refer to improving the cashflows that are emitted by the asset or (more likely) finding ways of making it easier to turn the asset into cash.

Further, the question was specifically asking about liquidity enhancement techniques. Therefore, suggestions which (could) impose a cash drain, such as margined swaps, are unlikely to be suitable.

(iv)

Buyer:

- The market for these investments is likely to be small. [1]
- The size of the insurer's portfolio will be a factor – a small portfolio is unlikely to have enough size or diversification to attract a buyer. [1]
- The administration of the loans will be an issue and this would be a barrier for a buyer unless they had a pre-existing portfolio of these type of assets. [1]

- The price achieved is likely to be reduced for the cost of capital and the buyer's own desired return on top of that. This profit will be lost to the company and may exceed the cost of seeking other external liquidity arrangements. [1]
- There will also be the cost of performing the transaction. [1]
- The insurance company will no longer have a longevity hedge against its annuity business. [1]
- The seller would lose any upside optionality contained with the block of business. [1]

Securitisation:

- The arrangements differ from the mortgage backed securities that banks have typically issued due to the pre-payment risk being linked to both interest rates and mortality rates, so they may not be so easy to arrange. [1]
- Mortgage-backed securities were one of the triggers of the financial crash in 2008 as the risk of default on the bonds was misunderstood. Hence the quality of the mortgages in the insurer's portfolio will be closely scrutinised. [1]
- And the securitisation terms may not be favourable as a result of the transferred risks. [1]
- There will be frictional costs associated with securitising the mortgages, such as legal fees associated with setting up the required legal structures and fees charged by the institution managing the debt issuance. [1]
- The seller would lose any upside optionality contained with the block of business. [1]
- If the insurer needs to highly collateralise the mortgages, this may remove other valuable assets from its balance sheet. [1]
- Any equity tranche which is retained would continue to expose the insurer to residual credit risk [1]

Credit arrangement:

- Banks may impose tighter conditions on the arrangement than the capital markets would, demand more collateral for the equivalent borrowing or charge a higher fee for providing the facility. [1]
- Bank relationships typically require more management time. [1]
- It may be difficult to achieve the required capacity. [1]

Alter term to allow or require regular payments:

- Customers may not respond favourably, especially if the prepayment is compulsory. [1]
- Voluntary prepayments may be timed inconveniently, e.g. they may take place just as interest rates fall. [1]

- Improvement in liquidity may be quite marginal – certainly of a much lesser order of magnitude compared with selling or securitising the business. [1]

[Maximum 6]

The question was only concerned with disadvantages.

Student responses were mixed.

(v)

- Residential mortgage assets are illiquid [½]
- Transforming these assets will increase the company's overall liquidity. [½]
- It may be expecting to experience significant liquidity issues due to a projected short or medium term shortfall of cash inflow against cash outflow, and needs to raise cash by selling assets. [½]
- Making the current portfolio liquid will allow the company to recycle the proceeds into new mortgages or other lines of business. [½]
- Gives another avenue for fund raising as well as debt and equity issuance. [½]
- May transfer the risks associated with the mortgage off the insurer's balance sheet. [½]
- This source of funds may be cheaper than simply raising the finance directly from a credit institution. [½]
- Allows the capitalisation of the difference between the yield charged to the mortgage holders and the yield demanded by purchasers of the debt. [½]
- There may be a regulatory driver to the company's wishes (i.e. changes in the way these assets are treated for regulatory or capital adequacy purposes which would be more favourable if they were more liquid, e.g. following the introduction of Solvency II). [½]

[Maximum 3]

This question was poorly answered.

As before, students did not always adequately distinguish between the term of the loan and the liquidity from the insurer's point of view (i.e. the ability or not to turn the loans into ready cash)

(vi)

- Treasurers use the term float to describe cash balances. [½]
- This comes in a variety of forms:
  - Payment (or disbursement) float – credit balances held while waiting for debit payments to clear. [½]

- Availability float – sums due to be credited once receipts have been cleared. [½]
- Net float – the difference between payment and availability float. [½]

[Maximum 2]

A straightforward 2 marks of bookwork.

(vii)

- Float management is about controlling the delays between the time goods or services are received and the time payment is received. [½]
- The objective will be to maximise the net float. [½]
- A company can delay payments for invoices received for as long as possible, maximising the payment float. [½]
- Equally, a company can try and force the receipt of payments earlier from its customers. [½]
- The use of electronic payments has reduced the scope of using clearing delays to manage float balances. [½]
- However, techniques such as opting to pay by cheque for services or goods received will increase the disbursement float. [½]
- Or for example by using local banks for deposits while drawing payment cheques on distant branches. [½]
- When extending credit terms to new customers the terms can be set to achieve payment faster. [½]

[Maximum 2]

[Total 26]

Most students made decent attempts at this question.

**Q4** (i)

- A comparison with its ICA leads to small differences in capital which indicates no reason to implement an internal model. [½]
- The company may write “average” or “standard” risks and so feel that the standard formula is appropriate. [1]
- Lower cost / effort: companies do not need to implement a costly internal model. [1]
- In particular, implementation overheads may be too high for a small insurance company. [½]
- It will be easier to explain and document the standard formula calculations within the organisation. [½]
- There is a lower requirement on the expertise required to implement... [½]
- ... and to validate the standard formula. [½]

- For example, calibration of an internal model can be particularly difficult... [½]
- ... particularly tail risks/correlations... [½]
- ... and particularly for risks where there is relatively little data e.g. operational. [½]
- Less time required to implement. [½]
- There is less scope for change in the future (than for the internal model) which means there is less requirement for model change and change governance processes. [½]
- Do not have to gain regulatory approval. [½]
- The company may be using the SCR as a check on its ICA calculation [½]

[Maximum 4]

Most students offered satisfactory solutions.

Some of the points are quite similar so students needed to be careful to distinguish any subtleties to gain further marks.

(ii)

- The regulator has indicated that the group should use an internal model to calculate its SCR. [½]
- The standard formula does not capture the risk profile of the group adequately... [½]
- ... due to the non-standard nature of the products written by the two subsidiaries... [½]
- ... and the non-standard assets held. [½]
- There may be a material difference between the standard formula results and the expected ORSA. [1]
- An internal model may deal more accurately with a having both a domestic and foreign subsidiary [½]
- Similar sized groups are using internal models. [½]
- The group believes that the standard formula leads to an inappropriately low capital requirement by under-stating the risks. [½]
- If the capital requirements are too low this means that there is a much higher probability of insolvency for the group and/or its subsidiaries. [½]
- The group believes that the standard formula leads to a higher capital requirement than is appropriate to its risk profile. [½]
- If the capital requirement is too high then this leads to an inefficient use of capital ... [½]
- ... which could have been invested in other projects which would earn the required (or higher) return. [½]
- The group will be able to clarify its risk appetite using analysis aided by the internal model. [½]
- The group already has a sophisticated ICA model in place which has been embedded and requires minimal work to get it to the required standard of an acceptable internal model. [1]

- An internal model allows the group to allocate capital to the legal entities and business lines where necessary... [½]
- ... to help assess the risk-adjusted performance of each of these. [½]
- The group will be able to take credit for the dynamic hedging performed by the central team when it has implemented an internal model but this is not the case if it uses the standard formula. [½]
- An internal model may allow more sophisticated computations around correlation or diversification [½]
- An internal model will help the group to improve its risk management. [½]
- The risk sensitivity of the results is improved through use of an internal model.
- So the group will be able to identify effective risk mitigation techniques using output from the model. [½]
- The group can better monitor the performance of the risk mitigation techniques... [½]
- ... which will allow these to be improved in future. [½]
- The group will be able to output results more easily at different levels of granularity... [½]
- ... which will help it to understand its profile better. [½]

[Maximum 7]

Solutions to this were mixed, despite a relatively large number of points students could have made.

- (iii) Use test: [½]
- The liability and asset profiles of the various legal entities are quite complex and getting senior management to understand the intricacies of analysis done using an internal model for these will be difficult. [1]
  - The different systems already in place in the different legal entities will need to be implemented as part of the internal model or replaced. A unified approach to modelling and interpretation and use of results will need to be implemented across the group and this may prove to be difficult because of the differing skill levels and culture across the legal entities. Consequently, it may take a long time to consistently use the unified model across the group when making decisions. [1]
- Statistical quality standards: [½]
- Justifying that the probability distribution forecast is credible and based on sound techniques will be more difficult for this group as there will be few or no benchmarks that can be used for comparisons due to the non-standard nature of the business. [1]
  - The inclusion of dynamic hedging actions and the timing of transactions will need to be allowed for if they are to be recognised, which makes meeting the required standards more difficult. [1]
  - The modelling of dependence will need to be justified. Due to their profiles there may be some liabilities or assets – such as bond guarantees – where use of a basic correlation matrix is inadequate. [1]

- Getting adequate data for some of the specialist assets or non-standard liabilities will be difficult or even impossible in the short-term. The data that is available will probably need to be adjusted to allow for firm-specific design. The adjustment of data will put increased requirements on the group to justify its assumptions. [1]

Calibration: [½]

- Various risks to which the group is exposed will exhibit fat tails and the exact model to use to represent these will not be clear. Calibration is also more difficult due to the data/parameter issues mentioned above. As such, it will be difficult to demonstrate that a 99.5% VaR measure is being used. [1]
- Calibration can be very subjective. [1]

Profit and loss attribution: [½]

- It may be difficult to explain the effects of profit and loss for particular risks if the granularity to which the internal model is calculated is different to the way in which the risks impact assets and liabilities separately. (i.e. the model may be calibrated at a total loss level but the impact on risk changes is vastly different for assets and liabilities.) [1]

Validation: [½]

- Validation may be made more difficult by the company structure as each subsidiary will be expert in its own products and therefore likely to be best placed to validate its own components of the internal model. The validation therefore needs to be co-ordinated with oversight to ensure that equivalent standards are applied. The modelled inter-actions and higher level group risks also need to be validated. [1]
- Testing results against emerging experience will require some time to have elapsed between building the model and using it, which would delay its implementation. The fat-tailed nature of some of the risks will mean that useful validation experience would not necessarily emerge every year. [1]

Documentation: [½]

- Compiling adequate documentation for the group will be difficult as the local regulators for the legal entities in different jurisdictions may have differing requirements. This is especially true when dealing with specialist assets and non-standard products. There is also a language issue. [1]

[Maximum 6]

A relatively straightforward application question, with useful marks scored by most students.

Weaker students were able to name the tests but not link them to the specifics of the company in the question.

- (iv) The main risk is that more issuers default and/or **more** payments are defaulted than expected in the pricing of the insurance, so that Monovators has to step in as guarantor and pay more outstanding debt payments than expected. [1]

For example, this may be due to a collapse of the economy in a country within the Eurozone / the potential exit of that country from the Eurozone... [½]  
... if the issuer is government-related within that country... [½]  
... or has significant exposure to that particular economy (e.g. through the banking sector) [½]

It may be due to the Euro appreciating significantly against the value of the domestic currency if the issuer is outside the Eurozone, so that the domestic cost of the debt repayments increases [½]

It could be due to a general economic recession [½]

Interest rates may have increased, leading to higher defaults on loans [1]

The creditworthiness of borrowers (e.g. as measured by credit ratings) may have worsened, leading to higher defaults [½]

There is significant non-separability of / concentration of / dependency of / contagion / systemic risk in relation to the defaults [½]

The debt instrument issuers may also experience liquidity or cashflow issues under such conditions ... [½]

... which means they are unable to pay the premiums for the guarantee provided. [½]

Significant appreciation of the Euro against the British Pound would mean that the cost of the parent stepping in as a guarantor increases in the case of the main product. [½]

[Maximum 3]

Solutions to this question were mixed.

To score more than token marks students needed to relate the risk to the company/product range – it was not adequate to simply name a series of risks.

The question expected students to identify the **main** risk and given the marks available an explanation beyond one line was expected.

- (v) A correlation between two factors which is lower than 1 indicates that the relationship between those factors is less than perfectly correlated. [½]  
This means that the scenarios which lead to these individual risk capital requirements do not usually happen simultaneously. [½]  
This results in the effect of diversification. [½]

The total capital for Monovators would be lower because of diversification between risks in that legal entity (inter-risk diversification). [½]

The total capital at a group level would be lower due to geographic diversification (diversification between the same risks in different locations – i.e. equity risk in France and the UK) ... [½]

... as well as diversification between different lines of business. [½]

[Maximum 2]

This was a relatively concise question – essentially describing the impact of diversification – but students struggled to gain meaningful marks.

(vi) The dependence of risks inherent in a legal entity or group should not just be based on correlation matrices as these do not adequately capture relevant characteristics of dependence such as causal relationships. [1]

The higher capital requirement may be due to non-linearity... [½]

... i.e. the change in capital requirements is not linearly related to the change in risk factor values, [½]

... for example due to the guaranteed nature of the liabilities. [½]

The correlation matrix approach may not allow for there likely being higher correlations between risks in extreme conditions, whilst a stochastic model which uses specific copulas or other methods of modelling dependence will allow for this. [1]

It may be due to non-separability... [½]

... i.e. risk drivers interacting with each other, so that simultaneous moves in risk factors will have an additional effect on the capital requirements (i.e. risk factor cross terms have a significant effect on capital). [½]

For example, where multiple debt issuers for which Monovators is a guarantor default due to the Euro sharply appreciating against the British pound (where the parent company is based). [½]

This causal relationship or “wrong way” risk is not captured by the correlation matrix approach. [½]

In Monovators’ case, as noted in part (iv) there can be a significant contagion effect which leads to various issuers of debt instruments defaulting. [½]

There could be a mistake in the calculation. [½]

There may be group-level risks not allowed for in any subsidiary, e.g. head office operational risks. [½]

[Maximum 3]

[Total 25]

This question was more difficult and was the least well answered of the paper.

**END OF EXAMINERS' REPORT**