

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

September 2015

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.

F Layton
Chairman of the Board of Examiners
December 2015

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. This paper had no calculation sections however marks would be awarded for workings in the case of numerical answers.
3. Candidates' answers are made up of a series of points. For example, a point can be stating a valid type of risk, describing the type of risk or (part of) a calculation.

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

1. 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, pension funds, insurance companies and the securities markets function.
2. Most candidates attempted answers to every question, with the exception of question 2 part (i) and part (ii) which were on "new" material and were skipped by several candidates. There was a reasonable degree of clustering of overall marks near the pass mark, with slightly more students than previously just attaining that pass mark or above. However, few students excelled and therefore the marks scored by well-prepared candidates were lower than in previous diets.
3. As usual, candidates will benefit from practice with past papers and 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.
4. Candidates are also once again reminded to *read the questions carefully* and frame their answers to the situation described or to the specific instruction given, rather than offer generic answers. Particularly where the context seeks to test a specific piece of understanding, generic answers may score few marks. Also, where the setting is unfamiliar the question may give useful information on what points might be relevant in the answer.

5. Question 1 concerned demonstrating an understanding of the differences and unique issues affected by a banking vs insurance balance sheet, how business might be allocated between each, and then considered how a new type of security (a bail-in bond) could be used. It also considered some aspects of regulatory capital modelling. Several sub-questions needed to be answered from the specific perspective of a user of, or investor in, a given security which not all students appeared to appreciate.
6. Question 2 was primarily about the effect of "hot money", which was defined in the question and was to all intents an applied macroeconomics question related to the securities markets. There was also a "standard" section on risks affecting an investment fund. Given that the topic itself was unfamiliar, candidates who read the question carefully (and used the definitions provided) performed better than others.
7. Question 3 was divided into a fairly familiar section on credit default swaps and then an atypical SA5 question examining the Merton model which was pseudo-bookwork but answered surprisingly poorly.
8. The comments that follow the questions concentrate on areas where candidates could have improved their performance in individual questions.

C. Comparative pass rates for the past 5 years for this diet of examination

<i>Year</i>	<i>%</i>
September 2015	46
April 2015	35
September 2014	32
April 2014	46
September 2013	44
April 2013	43

Reasons for any significant change in pass rates in current diet to those in the past:

The pass rate for this exam is more typical following two sessions of relatively poorer results.

Solutions

Q1 (i)

- A bank's business is primarily loans to customers, which are reflected as assets on the bank's balance sheet. The bank's business is therefore primarily asset-driven
- The loans are funded by the deposits of savers which typically have a shorter duration than the loans.
- As deposits may be insufficient to cover the banks' loan book it may choose to borrow money from other banks or from investment markets.
- An insurer's business is driven by policies written with customers promising to pay a contingent amount in the future. The insurer's business is therefore primarily liability-driven.
- The insurer's assets are funded with insurance premiums paid by customers which are invested into the securities markets.
- The insurer is not likely to borrow moneys to leverage its equity returns; the bank will however have a highly leveraged balance sheet.
- The terms (duration) of assets and liabilities are likely to be very different between bank and insurer. The bank is likely to have long-term assets (customer loans) and short-term liabilities (customer deposits) whereas the insurer has shorter-term assets (invested premiums) and longer-term liabilities (endowments, life or general insurance contingent claims).
- The types of assets held likely to be quite different: banks hold mainly debt securities, insurers are more likely to hold assets like inflation-linked securities and equities (according to the type of insurance they write)
- The insurer will typically attempt to match the duration and sensitivity (to interest rates, inflation, etc.) of its assets more closely to its liabilities. The bank may choose to run a less matched portfolio in search of profits.
- The insurer's balance sheet will be much more affected by (valuation) assumptions and models than the bank's balance sheet.
- Banks have a higher tendency to place liabilities off balance sheet.

(ii) **Credit risk**

- Loans extended by the bank will explicitly expose the bank to credit risk.
- The insurer may be exposed to credit risk implicitly through debt security holdings in its investment portfolio.
- The insurer may experience credit risk through the potential default of any reinsurer it uses.

Liquidity risk

- The loans are funded by the deposits of savers which usually have a (much) shorter duration than the loans; because there is no direct link between the assets and liabilities the bank is exposed to liquidity risk through if its depositors withdraw their funds in large numbers.
- The bank's investment banking arm may trade on its own account and this will add a full range of **market risks** from the positions it takes. However, as the source of the funding for these activities tends to come from shareholders or wholesale sources there is no liquidity risk.
- Regulators can require prudent margins when assessing insurers' long-term liabilities and this creates an initial strain when business is written (because the initial strain must be funded from cash elsewhere in the business). This requires initial capital to overcome and this may be funded from shareholders, surplus assets accrued from past profits or from other members.
- Insurance products can include customer options that create liquidity risk, for example where a product can be terminated early at the option of the policyholder.
- However, there is less liquidity risk than the bank because the assets and liabilities are typically linked together – a liability is linked to a premium accumulation.

Underwriting (also “insurance”) risk

- Insurance products protect against risk events or provide savings elements and these create underwriting risk.
- These risks include mortality, morbidity, longevity and various kinds of general insurance risks e.g. catastrophe risk

Mismatching / Duration risk (also interest rate risk in case of bank)

- Life insurance liabilities are typically longer than assets in duration as often matching assets do not exist with sufficient duration. This gives rise to mis-matching risk.
- Banks may be exposed to interest rate risk through a mismatched book where short-term rates (affecting liabilities) differently to long-term rates (affecting assets).
- In a stress event insurance liabilities have higher loss absorbency than bank liabilities as the size of insurance benefits is often linked to the asset performance or the profitability of the company.

Reputational risk

- Bank accept reputational risk as they are more reliant on public confidence (for sourcing deposits) so more susceptible to reputational risk (loss of confidence can be very damaging, causing a run on the bank)

Regulatory risk

- Both banks and insurers accept regulatory risk which affects their level of capital held and as relevant business and sales practices.

Foreign exchange risk

- As this is a multi-national group, either or both bank and insurer may write business internationally which means it accepts foreign exchange risk in profit repatriation or through the balance sheet.

Market risk

- The risk of adverse movement in assets held in the investment portfolio or the insurer's shareholders' / policyholder funds.

(iii)

- The subsidiaries will have their own risk appetites. This may be linked to regulatory requirements, existing risks on their balance sheets and/or the risk appetite arising from economic capital considerations.
- In particular, risks may have different regulatory costs depending on which balance sheet they arise.
- This is particularly the case given the international nature of the group.
- In order to determine an optimal risk allocation the Group could use a Risk Adjusted Performance Measure (RAPM).

- The return on capital the group requires may be different for each subsidiary.
- There will be an expected return from the new risks (which may differ according to which subsidiary it is placed into), and this expected return would be compared against the required return on capital for each subsidiary.
- This may make some risks more attractive if they are placed on one of the balance sheets rather than the other. At the margin they may be unviable on one of the balance sheets but acceptable on the other.
- Return may also be affected on the tax position of the subsidiary.
- The two balance sheets will offer different diversification benefits for a particular risk. This will affect the amount of capital required to cover the risk and therefore affect the return on capital that the risk will provide.
- ... and the Group would need to consider whether diversification can be taken between the two subsidiaries as well as allowing for diversification within them.
- ... and if it does so, how it will manage the interaction of the two balance sheets on an ongoing basis.
- There may be operational advantages to dealing with the risk within one subsidiary over the other, for example, staff skills and IT systems which are more capable to processing this type of business.
- If the risk will be mitigated in due course, the risk mitigation techniques available may be different depending on which balance sheet the business is written.
- ... the bank may have access to specific markets that allow it to mitigate risks on its balance sheet, for example through repackaging business through securitisations.
- ... whereas the insurer will be able to reinsure insurance risks.
- Certain types of risk will require specific regulatory permissions to underwrite.
- The group will need to consider the expertise available and the systems available to each of the subsidiaries
- ... and hence the ability of management to be able to monitor the risk exposures effectively.
- If additional capital needs to be raised to support the risk then the Group may find it easier to raise it from one of the balance sheets than the other.

- One or both subsidiary may have specific business plans or growth goals favouring the allocation of risk to it.

(iv)

- The risk appetite of each subsidiary will matter...
- ... as will the subsidiary's capacity, taking into account its available capital and other resources (e.g. IT and staff)
- Differences in operational ability to deal with risks (including underwriting skills, risk assessment and mitigation skills) may cause the group to prefer to re-allocate certain risks from one subsidiary to the other.
- Differences in the expected return on the risk within each subsidiary means the group may prefer to move risks to the more advantageous entity.
- The tax treatment of capital and also the tax treatment of profits as they emerge on the required basis can lead to the deferral of tax payments in one regime more than another.
- There may be variations under the two sets of rules that give one approach an advantage when considering the Group's particular situation and what assets it can count towards capital.
- Examples include treatment of intangibles
- ... And deferred tax assets.
- Some products can be issued by both banks and insurers and hence as capital rules alter there may become one sector that offers a capital advantage.
- Treatment of risk exposures under the new rules may find that certain types of risk are penalised more heavily under the banking regime or the insurance.
- For example, in a Group structure it may be more advantageous to carry equity investments in an insurer than a bank or vice versa.
- The relative strength of supervision across both types of business could lead to a decision to favour one balance sheet over another when writing business. This could particularly be the case where regulatory arbitrage is possible.
- Products may be developed in one entity that give rise to low capital charges whilst servicing a customer need and there may be a market move to sell more of these products if capital becomes more expensive. For

example, unit-linked business often carries a lower capital charge in a life insurance entity because the market risk is borne by the customer.

- Customers may expect to purchase a type of product through one subsidiary however the other subsidiary may be better equipped to handle the risk going forward (e.g. protection insurance sold with bank credit products but which fits more naturally on the insurer's balance sheet once it has been sold)
- There may be hedging reasons for moving risk between subsidiaries to offset existing risks within a subsidiary by using new risks taken on by the other subsidiary.
- Corporate action reasons: the group may for example be preparing one subsidiary for sale and wishes to "tidy up" the risks held within it
- One or both subsidiary may have specific business plans or growth goals favouring the allocation of risk to it.
- There may be liquidity management reasons for moving the business from one balance sheet to the other.

(v)

- Equity capital is typically taxed differently to debt capital.
- Hence the cost of capital between debt and equity is often different, and hence the capital structure is not indifferent to the split
- Some large institutions are deemed too big to fail.
- This often means that they have a regulatory underpin or guarantee that smaller enterprises do not. Hence the size of the organisation can matter in determining the capital cost.
- There is information asymmetry in that banking and solvency regulations are aimed at different trigger points.
- Hence hitting a trigger point means different things for the organisations.
- "Over-allocating" debt to one subsidiary may create (perceived) distress in that subsidiary, leading to customer disutility and higher borrowing cost therein. So the capital structure equivalence proposition may fail once borrowings exceed a certain comfort level. (Note: the proposition may still hold if the parent guarantees all indebtedness by all subsidiaries)
- The dividend irrelevance proposition may fail if, for liquidity management reasons, the parent values more highly if (abnormally) high dividends flow from one subsidiary to the parent.

(vi) **Trigger level**

- The level of the conversion trigger will be important. A trigger set too high will be worthless but a trigger set too low will affect the cost of capital.
- The level of the trigger set will be key, particularly if it is not triggered by the regulator depending on the circumstances of the issuing bank.
- If the trigger is set incorrectly then it may trigger too late when the bank is already insolvent or too early which could have consequences for investors' confidence in the bank.
- An assessment of the probability or more importantly overall market circumstances of the trigger being hit will be required. The insurer may itself experience stress at the same time.
- Due to the ability of some insurance liabilities to be loss absorbing the full effect of any write-down at the trigger point would not be fully passed on to shareholders.
- The insurer will need to evaluate what is actually received in the event of the trigger being hit and conversion taking place (i.e., how many new shares and what they might be worth)

Pricing, return and operational considerations

- The pricing of the instruments is difficult, particularly where the market conditions are close to the boundary conditions that trigger conversion.
- The bond is a new and unusual asset class which the insurer itself is unlikely to have expertise in.
- ... And using the bank's expertise would give a clear conflict of interest.
- What yield is available on the bond? It may be necessary to offer a higher yield on the bail-in bond due to lesser investor demand or due to other uncertainties around its term and eventual return.
- Both the tax and accounting treatment of the bond may not be clear and would need to be considered for the impact on the insurer.
- In particular, the tax treatment of dividends and coupons is often different. In addition, the tax treatment of a loss incurred in the event of a write-down will need to be factored into the position of the insurer in a stress event.

- Will the bail-in bond be credit-rated and if so, what is its (likely) rating going to be? Will the insurer be allowed to hold it based on any credit rating restrictions?

Bail-in bond liquidity

- There may be limited investor demand for the bonds. This would make the bonds illiquid and give the insurer no choice but to hold them until redemption or bail-in.
- This would have knock-on consequences for the insurer's own liquidity risk and would increase the economic cost of the bonds.

Contagion / concentration risk

- There would be a clear contagion risk. At the point of conversion the insurer is likely to face difficulty itself and having the debt convert to equity at that time would exacerbate the problem.
- ... especially since the equity thus received would be shares in a distressed financial institution, which might not be worth very much
- The conversion option would reduce diversification benefits between bonds and equities in a stress event which in turn increases the economic cost of holding this asset from the insurer's perspective.
- If the issuing bank is unconnected then some of the contagion risk is mitigated. However, there is still a strong correlation between insurers and banks which would mean some contagion risk will be retained.
- As financial institutions are likely to be the only issuers of these types of securities the insurer will need to monitor its concentration risk to ensure it has not built up too high a concentration to the financial sector.

Signalling

- The issue of such bonds may signal internal concern on the part of the issuer, so indicate a low quality security.

Liability matching and risk appetite

- The insurer will want to understand the extent of the bail-in bonds matching any existing (or proposed new) liabilities the insurer has.
- The bond itself may not be suitable to match liability cash flows given the optionality contained within it, or its term.

- Does the insurer's investment strategy contemplate or restrict inclusion of bonds of this type? If so, how much? Do its customers or shareholders believe it appropriate?
- From where will the insurer take money to invest into the bonds and hence what is the opportunity cost or other impact?
- Are the bail-in bonds a useful diversifying asset to hold?
- Does the bail-in bond encourage the *issuer* to take excessive risk?

Capital adequacy and regulatory issues

- The likely behaviour of regulators towards the operation of the trigger point is unknown...
- ... And if the likely point of intervention is not fully transparent then there remains a risk that an enforced write-down could happen at a time when the insurer would not expect to intervene with a management action.
- How does the bail-in bond count towards the insurer's capital?

(vii) Regulators may consider it a **good idea** because:

- Debt holders will be providing some loss absorbency for institutions that may otherwise need to be rescued by the tax-payer.
- ...since banks rescued as a going-concern would not trigger the usual insolvency proceedings.
- (Providing there is investor demand) the bail-in bond is an extra route to securing new funding without having to resort to e.g. central bank support

Regulators may be **concerned** because:

- The regulator will need to define what the stress event(s) is/are; there may be resulting inconsistencies in the legal definition of the stress event in the bond's documents creating added uncertainty at the point of stress; the regulator would need to address these at the time when its attention is also needed dealing with the stress event itself.
- The instrument may be harder to value and hence create difficulties when assessing capital in the hands of the buying institution which may also be a regulated firm; i.e. the regulator may create new problems for itself in its supervision of the buyer of the security
- For an international group that can select a territory to issue the bonds it could find that they do not meet the requirements of all of the regulators they are governed by.

- i.e. there would need to be regulatory co-ordination to prevent arbitrage by issuers around, say, different definitions of stress event by different regulators/territories, or different treatment of the bonds for capital adequacy purposes
- Equally, the bank may be able to issue the bonds in a territory where the regulators approach is more lenient towards the trigger point. This regulatory arbitrage would reduce the effectiveness of the loss absorbency provided by the instrument.
- The regulator may be concerned if the bonds are held by other systematically important investors (i.e. risk passed on to another equally important market participant)
- Similarly the regulator may be concerned if the bondholders that are forced to take a loss during a bail-in are likely to be pension schemes and individual savers. So although taxpayers in general have been protected to some extent, the loss may be borne by groups where that is not politically desirable or where the taxpayer ultimately needs to make whole the loss anyway.
- The reliance on this capital for banks but not for insurers will affect the relative cost of capital between the two.
- ... As a consequence the regulator may see risks being written on insurers' balance sheets rather than banks' balance sheets where there is a choice.

(viii)

- Shareholders of issuing institutions would see the value of their equity diluted when conversion was triggered.
- Shareholders may initially welcome the bonds as a way of raising capital without the shareholders themselves having to provide it.
- However, it does increase the institution's leverage...
- ... and the extra coupon payments may reduce profits available to shareholders
- ... and the coupon is likely to be higher than a non-bail-in equivalent bond to attract investors into the bail-in bonds because these investors would lose their priority ranking in any wind-up of the issuer
- On balance the effect on the share price is unpredictable – it depends on shareholders relative view of the new capital vs the increased leverage and debt servicing cost.
- In a stress situation, shareholders may be grateful that the bail-in bonds convert to new equity as despite the dilution, as it removes a prior ranking security from the capital structure.

- The legal rights of shareholders can vary by jurisdiction. This will mean the terms of the debt may vary which will then prevent proper fungibility of debt, which will reduce the liquidity in any particular territory of these bonds...
- Investors in the bail-in bonds might try to hedge their position if the stress event is approaching by shorting the stock. This would negatively affect shareholders and exacerbate the problem in a stress situation.
- ... Hence the regulator may need to prevent the stock being shorted. This would be difficult given the market's ability to use derivatives to create a synthetic short.
- Similarly, the dilution effect when conversion is triggered will impact the same bail-in bond investors and may reduce the recovery of losses as the market recovers.

(ix)

- A key consideration will be the cost of capital required to be held by the regulator....
- ... taking into account spare capacity or risk appetite within the relevant subsidiary
- The bank may be able to issue the equity release product or insure the longevity risk component on the balance sheet of an insurer not covered by Solvency II. In this way it may be able to reduce the overall cost of capital.
- The relative sizes of the balance sheet and the capability to finance the loans will be a factor. The bank may inject capital into the insurer should that be the chosen method...
- ... But the fungibility of that capital and the ability to extract it again without incurring frictional costs will need to be considered.
- The capital requirements driven from internal models employed by the bank and the insurer could imply different capital requirements are needed under the same risk. This is effectively regulatory arbitrage between bank and insurance regulators.
- The two different solvency accords will imply different costs of capital for a variety of reasons.
- The expected return from issuing the product in each subsidiary may differ, taking into account operating costs, tax differences, etc. [1]

- Another key consideration is the skill set available to accept and absorb (or mitigate) the risk, including underwriting, operational or risk management skills available in each subsidiary
- Market sales practices may affect the decision, i.e. where do potential customers expect to purchase this product?
- What are competitors doing?
- Concentration risk / similarity to existing risks within the subsidiary may affect the decision. This is a new product but it may have similar characteristics to existing products (e.g. similar to standard mortgages if issued from within the bank)
- Conversely if the product is unique it may provide valuable diversification within the product range of the relevant subsidiary.
- For a bank the equity release would be treated as a residential mortgage.
- The insurer has a larger scope to take into account risk mitigation techniques under the solvency regulations. In particular, for equity release it could seek to reinsure the longevity risk to reduce the capital required.
- It could seek a reinsurer in a jurisdiction that is not covered by Solvency II and hence has lower capital costs itself. This can result in lower reinsurance premiums for the insurer.
- The bank could seek to pass the risk off its balance sheet to other institutions itself, for example shadow banks ...
- ... But in either case the group could consider securitizing the product and removing it from the balance sheet completely.
- Any risk mitigation options will need to be assessed for cost to ensure that the product remains economically viable overall.
- However, the availability of the reinsurance needs to be determined. The market for longevity reinsurance is limited.
- The allowance of reinsurance within regulation may be limited so the current structure of the insurer's reinsurance arrangements will need to be examined.
- The treatment of any illiquidity premium under the insurance regulations will be a key factor as the insurer will use the equity release asset to match other liabilities.

- Although not directly a capital cost, there may be other costs involved in tailoring the equity release asset to ensure it qualifies for an illiquidity premium.
- ... Removing any pre-payment options through the use of a special purpose vehicle or securitisation techniques may be expensive and reduce profits overall.
- The insurer will need to assess the impact on its internal model if it has one and the extent to which this business is able to achieve diversification benefits against its current portfolio of risks. It will also need to do this to satisfy the use test.
- The bank could issue the equity release loan itself and insure the longevity risk internally if that reduces the amount of capital it requires overall.
- The bank could use the equity release product as an offering to its own residential mortgage borrowers that have fallen into arrears or who have cannot afford to switch from an interest only mortgage to a capital repayment mortgage.
- ...This would defer repayments but give the bank direct ownership of the property and remove the risk of default.
- This provides the bank with a business opportunity to reduce capital charges on debts where the LTV ratio has fallen too low.
- There may be legal hurdles to issuing the product from one or other subsidiary (e.g. a licence may be needed)
- There may be explicit business or growth plans favouring the issue of the product by one or the other subsidiary

(x)

- Note: Both alternatives are internal calculations (the one having been approved by the regulator for capital adequacy, the other likely to be used for strategic management of the business); the standard formula is therefore not relevant.
- The calibration of the model to a certain level of default may not be appropriate for the level of capital strength that the insurer aspires to.
- For example, if it were to pursue a high credit rating it would want to target a probability of default below the level that Solvency 2 is calibrated to.
- There may be regulatory prudence incorporated into an approved internal model, particularly for organisations deemed too big to fail. The insurer's

internal model may be calibrated to its own view of a best estimate and allow for the additional cost of capital of meeting a regulator underpins.

- The different purpose and construction rules could manifest themselves through methodology differences or differences in views of the calibration itself.
- e.g. the use of different risk measures (say, VaR vs TVaR), or different time horizon, or confidence levels
- Economic capital model may use a longer time period as it is used for strategic planning rather than short-term solvency, and may also apply different likelihood of stress factors occurring etc.
- The regulator may have imposed add-ons that the insurer does not believe constitute a best estimate based on its own data.
- The regulator may have approved a standard formula or partial internal model that does not account for all of the risks that the insurer is running adequately, particularly of the insurer is considering a new risk.
- The insurer may be using a model that allows for it to take advantage of risk transfer to another geographical area within its group where capital requirements are different.
- There may be diversification benefits that exist within the group that solvency rules do not permit taking allowance for.
- The Group structure itself, being multi-national, may not have the economic benefits fully realised within the capital model.

Part (i)	Candidates made reasonable attempts at this question.
Part (ii)	A standard SA5 question with many marks available – candidates generally did well. Candidates were expected to tailor their answers to the type of companies (insurance and bank) involved.
Part (iii)	Not all candidates understood that this question was about transferring risk (i.e. business) between the subsidiaries, and instead incorrectly answered on the basis of allocating capital.
Part (iv)	Not unlike part (iii), not all candidates appreciated that this was a transfer of risk post sale, and was not asking about capital allocation (although as with part (iii) regulatory demands would be a key factor to consider).
Part (v)	Nearly all candidates got the tax assumption but not much besides. This was a little surprising as the M-M proposition is mentioned

variously in the Core Reading and these could have been easy marks.

Part (vi) This question was poorly answered. A bail-in bond was a new type of security described and defined in the question however many of the headings under which points could be made were relatively standard SA5 headings and candidates could have scored better had they worked through a more comprehensive mental list.

Part (vii) Reasonably answered provided the candidate read the question and answered from the perspective from *all* users (issuers and investors) of the security.

Part (viii) Reasonably answered.

Part (ix) This was poorly answered considering the issue headings were once again fairly standard SA5 material and in addition the question was not unlike part (iii) or part (iv) so students would have already spent time thinking about and preparing for this type of answer.

Part (x) Not all students appeared to have read the question carefully enough or otherwise appreciated that both alternatives are *internal calculations* (the one having been approved by the regulator for capital adequacy, the other likely to be used for strategic management of the business); the standard formula is therefore not relevant.

- Q2** (i) A currency carry trade is a trade in which an investor sells a certain currency with a relatively low interest rate and uses the funds to purchase a different currency yielding a higher interest rate.

To be a carry trade most of the anticipated profit will come from the interest rate differential and not exchange rate movement.

- (ii) For many years prior to the global financial crisis interest rates were relatively high in many large developed countries compared with other countries such as Japan making carry trades profitable.

Since the global financial crisis interest rates have been uniformly low across the major developed countries meaning that there are no large volume carry trade opportunities.

Proprietary trading, historically a source of carry trades, has been scaled back due to regulatory pressure and unattractive capital rules.

- (iii) Banks chase profits by providing short-term loans at higher interest rates to foreigners relative to their domestic market. As the loans are short-term they can be quickly unwound when the situation changes e.g. the foreign economy's prospects decline.

Corporations accumulate money offshore in order to save tax. This money moves around chasing returns until the company finds a better use for it.

Insurance companies, corporations and parastatals with temporary "cash floats" may store these funds where they can earn the highest short-term rates which includes in banks of foreign countries with which they have no other business connections. (For example, several UK local authorities invested short-term funds into high-yielding Icelandic banks prior to the financial crisis)

Hedge funds have surplus cash from time to time. This money moves around chasing returns.

Foreign exchange traders in search of short-term capital gains as exchange rates respond to interest rate differentials and / or the flow of hot money.

Wealthy individuals ...

... and short-term investment or money market funds also invest hot money chasing returns on an opportunistic basis.

Bonus marks: The process of money laundering may require funds to be moved rapidly and somewhat anonymously from one location to another. During this time, it is likely to seek out the highest short-term interest rate available, and move quickly to another location a short time later.

- (iv) All other things equal, a country with relatively high interest rates which are not entirely explained by credit risk and/or anticipated near term exchange rate movements will attract hot money.

Changes in interest rates can therefore attract or deter hot money.

Government action (e.g. imposition of tax or penalties) may give rise to hot money flows (especially outflows from the country that has imposed the tax).

Anticipated exchange rate movement can attract or deter hot money on its own. It's a factor so long as it is anticipated.

A single large exchange rate appreciation will discourage hot money whereas a prolonged stepped approach would encourage it.

Hot money prefers to invest in countries:

- where the money can move in and out quickly and without onerous reporting

- where the country does not require excessive information regarding the ultimate owner of the moneys
- where there are tax benefits or at least the negative tax impact is minor relative to the anticipated profit

(v) **Hot Money Inflows**

Increased demand for the currency will push the exchange rate up.

Exports will be relatively more expensive to foreign purchasers and imports will be cheaper.

This will impact potential future GDP growth.

The bulk of the hot money is likely to be in the form of short-term debt.

Some of the hot money will be invested in liquid equities and liquid bonds.

This will increase the prices of all of the above.

Local sellers of short-term debt or other securities purchased by the hot money may re-allocate their proceeds into longer-term ventures however **hot money itself does not typically invest into property or direct production assets** (e.g. factories or infrastructure) as these have too high transaction costs and are not liquid enough. The hot money will, by definition, be in place for a short time only and wish to exit swiftly and with a minimum of penalty or transaction cost

So while some hot money may therefore indirectly cause investment in things that will produce new future income, much of it will be result in simply increasing consumption and bidding up the price of existing assets.

The hot money is likely to lead to inflation, increased consumption and security market bubbles.

Hot money causes difficulties in the market signalling mechanism by affecting short-term rates / distorting asset prices

Hot money undermines the effectiveness of monetary policy in the receiving country

For the reasons given above hot money has over-heated and destabilised the economy making it vulnerable to future changes in the world economy.

Hot money outflows

In time the hot money will leave because it knows that the economy is vulnerable and as rates normalise, the hot money will try to exist before the onset of financial crisis.

Also in time a better opportunity will present itself elsewhere in the world, which the hot money will want to take advantage of as soon as possible.

The country's economy is likely to endure a financial crisis caused by the sudden outflow of hot money.

The main problem is that the hot money outflow can cause panic and fear in the broader economy similar to the circumstances in the 2008 global financial crisis.

For example, domestic banks not wanting to lend to each other or businesses. For example, companies and people building up cash piles.

In these circumstances the asset price falls will be far worse than they would have been just for the exiting hot money.

GDP growth will suffer with the lack of confidence and the lack of lending.

The economy could enter a recession.

Over the near to medium term people and companies will need to reduce their consumption and levels of indebtedness in order to return to a more balanced economy.

- (vi) Exchange rate appreciation – The country could increase its exchange rate by for example selling its foreign reserves (if available).

A single significant increase would reduce or remove the financial opportunity for the hot money.

A stepped approach would not work. It would encourage hot money to move in faster as the prospect of predictable profits from the stepped exchange rate movement would be highly attractive.

Hot money is short-term and speculative and is driven by short-term interest rates.

The country could lower its short-term rates to remove the opportunity.

Capital controls, minimum holding periods and other regulation. Hot money wants to move quickly, freely and relatively anonymously, therefore any barriers to movement will discourage it from arriving in the first place.

The country could establish foreign cash flow restrictions in time and amount.

The country could make its currency non-convertible. It could require that loans in a foreign currency be directly linked to revenues in the same foreign currency.

The country could prevent foreign inflows from investing into the secondary securities market and instead force it to be invested into new productive capacity.

The country could introduce withholding taxes on income earned by foreign investors, making their effective return lower.

Increase bank reserve requirements and sterilisation

The country could intervene in the market to prevent exchange rate appreciation and sterilise the capital inflow by taking money out of the banking system by way of increasing reserve requirements.

Fiscal tightening to counteract monetary expansion

The country could use taxes to reduce demand for assets or reduce consumption.

Both of these measures (sterilisation and fiscal tightening) would have the effect of shifting the burden for the hot money problem onto local consumers or firms, rather than preventing the hot money from arriving.

(vii) Business risk

The extent of the impact of the hot money on the business risk will depend on the fund's objectives and on the number and nature of its competitors.

The fund's objectives might be, say, upper quartile performance meaning that the fund must react at least as well as its peer group or risk increased withdrawals.

The fund's direct competitors will be other funds. The fund's indirect competitors will be other investment opportunities.

The fund risks under-performing relative to its competitors and particularly compared with other competitors who are focussed on investing in areas that are likely to rise with hot money inflows.

The hot money will likely increase volatility of returns and increase volatility of the firm's income (especially if performance-related).

Depending on the style of funds being offered, some hot money may end up in the fund as client money (with the potential wish to be withdrawn quickly at a later point)

Fund clients may anticipate trouble in future and withdraw their investments

Regulatory risk

The government may respond to the inflow of hot money by e.g. sterilisation which adversely impacts local banks (and hence the value of local bank debt and equity may fall),

...causing negative returns to the fund if it owns these securities.

The government may disallow certain investment transactions which the fund may otherwise wish to make (e.g. prevent the sale of securities to foreigners) ...thereby impacting the fund's opportunity set and hence returns.

Interest rate risk

Hot money is usually attracted to short-term interest rates. This phenomenon has already occurred prior to the arrival of the hot money.

The impact of the hot money on the interest rate risk is that the increase in the short-term rates may lead to increases in the longer term rates.

Also, the hot money will increase volatility and particularly when it exits the country. The interest rate risk is increased.

Market risk

Hot money can sometimes invest in other assets that are deemed to be liquid which could include shares.

Either way, hot money will include short-term debt which will be used in part to purchase shares and properties inflating values.

The fund's investments in these asset classes will rise for a time and then deflate and perhaps even crash when hot money exits.

Any hedging strategies the fund employs will likely become more expensive as volatility increases (knowing that for example option prices increase as volatility increases)

Overall hot money increases market risk.

Foreign exchange rate risk

The fund is a large domestic fund. Any investments denominated in other currencies are likely to fall in market value as the exchange rate appreciates with the inflow of hot money and increase in value with the outflow of hot money.

Hot money increases foreign exchange risk.

Liquidity risk

Liquidity risk is likely to remain broadly unchanged during hot money inflows ...but could be much higher during outflows as share market and/or property market crashes might lead to large scale investor withdrawals from the fund requiring cash funding.

Also, the volatile markets might mean that the manager wishes to rebalance the fund but is unable to do so as some of the underlying assets cannot be sold at an acceptable price.

Sovereign risk

The sudden outflow of hot money can trigger a recession and a financial crisis.

The country is developing and may not have the governance experience to deal with the crisis appropriately.

This could lead to sovereign default which would impact the fund directly as it is likely to be invested in sovereign debt.

More likely is that the government will take a number of actions resulting from the impact of the hot money.

The impact on the fund will depend on the actions.

Credit Risk

Credit risk on held investments may increase if the counterparties have borrowed hot money without the means to repay it on demand.

Credit risk is not likely to reduce for any counterparty as a result of hot money alone.

Credit risk will be more difficult to estimate.

Hot money may artificially depress credit spreads (due to excess demand for certain interest-bearing securities) making it harder to evaluate credit risk accurately.

On its departure, hot money may precipitate a financial crisis as firms who issued debt to the hot money investors are collectively unable to repay all at once leading to potential defaults and so forth.

- (viii) The fund is large and should have the resources needed to monitor the hot money inflows and outflows at least approximately and indirectly.

As the typical impacts of hot money inflows and outflows are well documented the fund should be able to re-balance its investments to take advantage of developing bubbles
... and hopefully asset sales prior to the downturn.

For example the fund may tilt the portfolio towards securities expected to benefit from the currency appreciation and/or interest rate movements

The fund could also avoid investments in securities which are likely to experience higher volatility

The fund could increase its use of portfolio hedging techniques

As the fund is large and hot money tends to move in and out relatively quickly the fund may wish to avoid physical re-balancing in favour of using derivatives.

This may be particularly useful for less liquid assets.

For example, it may be easy to sell long-dated sovereign bonds in anticipation of a price fall as yields rise.

It may make more sense to use foreign exchange futures in anticipation of first a rise and then a fall in exchange rates.

The fund could worsen customer liquidity terms in anticipation of a financial crisis when the hot money leaves, although this needs to be balanced against probable negative customer response and reduced sales or higher redemptions.

Part (i) and part (ii)	These were both “new” material (i.e. not taken directly from the Core Reading) and accordingly either answered with near full marks or poorly / not at all. They were worth few marks in aggregate.
Part (iii)	Acceptable answers from most students. It was helpful to read the preamble definition and tailor responses accordingly (so, for example, sources for long-term fixed investment were not being sought).
Part (iv)	Most students understood that the interest rate was the primary source but few students scored well besides this.
Part (v)	This question tackled applied macroeconomics and most students scored some marks but few scored well.
Part (vi)	This was answered reasonably by most students.

Part (vii)	Disappointing answers were seen here. The issue headings are typical for SA5 however students did not seem to work through a comprehensive list and the average student scored less than half the available total. It is possible that the unfamiliar scenario (macroeconomics rather than say a bank) was confusing when in fact the same principles could be applied. Several students also failed to read that it was an investment fund which is not subject to capital adequacy in the way that a bank or insurer would be.
Part (viii)	A follow-on question to (vii) with responses to match.

- Q3** (i) Credit default swap (CDS) spreads may differ materially from bond yield spreads because:

There may be tax or other expense difference when comparing the bond against the “replication” equivalent of a CDS plus risk-free cash resulting in differential pricing between the two.

Information unrelated to credit risk is priced into either the bond and/or the derivative e.g. liquidity.

The CDS seller is not perfectly risk free. Different sellers may attract slightly different credit risk premium.

The CDS market can be larger for a given bond than the physical market due to speculators and investors holding synthetic portfolios. This is part of the liquidity effect referred to above.

CDS's are regularly traded. This marketability may exceed the marketability in the physical market making the CDS premium relatively higher. This is part of the liquidity effect referred to above.

The CDS market can be used by investors to access a foreign bondholder's credit risk without taking the exchange rate risk. This can push up the CDS premium.

Contractual arrangements for the CDS can mean that the CDS does not pay out when the bond defaults. For example, sovereign CDS's used to contain a restructuring clause meaning that the CDS did not pay out even though the sovereign had, in effect, defaulted.

CDS spreads contain an accrued interest premium which is not included in a bond yield.

CDS's often contain an option for the buyer to deliver the cheapest (to the buyer) being cash or the bond. This option has a cost and is reflected in the premium.

CDS spreads are quoted actual/360 and bond spreads are usually quoted on a 30/360 basis.

The CDS may not be available for the same term as the bond.

Bonds exist in a fixed quantity whereas CDS can be created or cancelled according to demand, and are therefore subject to different supply/demand imbalances.

The CDS price includes the CDS seller's **profit margin**; the traded bond price includes a brokerage and probably a bid-offer spread; these may be different.

Regulatory, operational or other restrictions may affect ability to own and hence demand for CDS and bond differently

- (ii) (a) V_0 is the value of the firm's assets at the outset.

D is the debt due to be repaid at time T including both principal and interest.

T is the time at which the debt can potentially default.

μ is the expected annual return on the firm's assets expressed as a % of assets.

σ is the standard deviation of return expressed as a number between 0 and 1.

- (b) and (c) cannot be logically separated.

$$d_2 = \frac{\ln\left(\frac{V_0}{D}\right) + \left(\mu - \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}}$$

The formula relates back to the unit standard normal distribution

$\ln(V_0 / D)$ is the difference between the value of the firm's assets and the debt at the outset expressed as ratio.

It is assumed that the firm will opt to default only at the end of time T and only if the value of the firm's assets is less than the value of the debt.

Natural logarithms are used because the formula is working in continuous time and the ratio is used to make the formula free from unit size.

The excess of V_0 over D at the outset is a key factor in determining the probability of default.

The higher the ratio the greater the amount of negative returns needed to push the firm into default.

$+(\mu - \sigma^2 / 2)T$ adds to the relative excess in the value of the firm the amount of returns the firm will generate by the end of time T .

Multiply by T as the formula is working in continuous time.

μ is the expected return because the formula assumes that we wish to produce a physical probability measure and not a risk neutral probability of default.

μ is assumed to be constant

The default is assumed to occur at a single time T .

Asset returns are assumed to follow a lognormal distribution (with drift).

$-\sigma^2/2$ is the geometric mean of the volatility. Volatility erodes return and geometric means must be used when working with percentages and not values.

σ is assumed to be constant

The numerator produces the percentage by which V_T will exceed D at time T .

This percentage needs to be standardised to the unit normal distribution. σ (square root T) is the standardisation factor.

This calculates d_2 which is number of standard deviations from the mean on the unit normal distribution. d_2 is the distance from the mean.

The direction from the mean is less than the mean or negative and hence the probability of default being $N(-d_2)$.

Part (i)	A more detailed examination of CDS pricing. Many students got the main issues (liquidity, counterparty risk) but only a few explored the differences further.
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Part (ii) An unusual question. The formula is given in the Core Reading but its workings are not discussed at length there. This question sought to examine students' ability to logically (rather than algebraically) explain what the formula actually does, with mixed results.

END OF EXAMINERS' REPORT