

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

April 2013 examinations

Subject SA6 – Investment Special Applications

Introduction

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

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

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

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

D C Bowie
Chairman of the Board of Examiners

July 2013

General comments on Subject SA6

As actuaries move into wider fields, the examiners are likely to focus on the practical application of core skills in what may appear unfamiliar situations. However, better candidates should be able to identify the key principles and considerations that a solution demands, since this should be a regular feature of their “day job”. Indeed, the ability to bring these familiar principles to bear on unfamiliar situations is, primarily, what is being assessed in this subject and others at SA level.

Candidates are reminded of a bias in the paper towards recognising higher level skills and practical application – this is intentional and will continue. Likewise the examination system does properly allow for prior subject knowledge to be assumed. Investment is a necessarily practical subject and, at this level, the examiners expect candidates to demonstrate a breadth and depth of competency as would be expected from a recently qualified actuary or senior student in a frequently evolving discipline. Hence simple regurgitation of bookwork will never be sufficient to ensure a Pass grade – and this was evident from the dispersion of candidates' responses in the more differentiating parts of questions.

Whilst the examiners will tolerate bullet point style responses, some candidates' handwriting was too poor to assess and they will have lost marks. Likewise “text speak” abbreviations will not be accepted.

Given the greater volatility in recent years and globalisation/integration of markets and economies, delivering an acceptable return from a long term strategy against an increasingly short term focus, disclosure regime and political/regulatory backdrop has become increasingly challenging for investors. However, the challenge can be viewed as just a more complex variant of the traditional risk/reward trade-off where the “return-free risk” is becoming increasingly and unfortunately common. Investors generally only have assets because they have liabilities and it is the latter that will drive strategy. In order to succeed, candidates must ensure they familiarise themselves with the prevailing investment issues and the general market background facing institutional investors in the 12–18 months preceding a diet. This particularly includes the solutions being debated by the various stakeholders. Hence questions regarding banking and derivative approaches, as well as active and passive asset management and insurance solutions, to asset and liability risk management or modern financial theory should be considered likely scope for examination. Against a background of the credit crisis, new asset classes and ways of structuring investments will themselves generate new types of risk (such as benchmark, model, operations, liquidity, credit and counterparty) and also the need for new ways of regulation, monitoring and management.

Finally the examiners encourage candidates to recognise there are different types of investor and stakeholders beyond purely pension funds where different taxation, time line and cost considerations will apply.

A clear trend has been the move towards solutions that balance risk and reward appropriately given the sophistication of the investor. Investors have also focussed on different legal structures to gain exposure to asset classes which will blur the traditional equity/debt allocation divide. Given an overall appraisal framework of “quality, security, profitability and liquidity”, candidates need to be able to explore the trade off each opportunity represents and any new types of risk (such as reputation, operations, liquidity, credit, model and

counterparty) and conflicts of interest incurred that justify new ways of regulation, monitoring and management.

Comments on the April 2013 paper

Another poorly answered paper consistent with recent diets. The pass mark was the same as the previous diet as the average mark remains much lower than the examiners feel ought to be achievable by candidates. This feeling is premised on an assumption that candidates are likely to be working already as advisers or asset managers in this most practical of fields rather than being those looking to transfer from another discipline. If candidates don't have this practical experience, they will struggle in the application and higher skills parts of questions, being both unable to recognise the key issues to analyse in the problems presented and also communicate their answers in the language of the markets.

Whereas previous papers had looked to examine capital market or government policy detail, this paper in many areas reflected some of the very practical wider corporate finance challenges and conflicts faced in trying to source adequate returns and the interactions between sponsors and the funds they sponsor in mutually challenging times. Even where a paper includes topics not previously examined, candidates should be able to carry out their analysis using the same fundamentals of economics, portfolio management, investor requirements, etc. that underpin more familiar issues.

It would seem that candidates are becoming more familiar with the ongoing trials and tribulations of the troubled nation of Actuarial and so typically answered Question 3 better than the other two, with some very good answers (albeit on average still foregoing more than half of the marks available). Question 2 attracted the worst response with average scores of around a quarter of the 30 available marks and no one achieved more than half marks on Question 1.

Those candidates that were unsuccessful will find their solutions lacked sufficient (and often the most basic) detail or application of knowledge and scored lower accordingly. Whilst some candidates are too narrow in their responses, a greater number still deviate from the topic and include irrelevant material or over emphasise minor points – although candidates will not be explicitly penalised for this, it gives an impression of a lack of understanding and, more importantly, wastes limited time. Time and priority management are key skills actuaries need to have. Where candidates made relevant points in other parts of their solutions, the examiners have used their discretion as to whether to recognise these answers or not. Likewise the examiners share and agree alternative possible solutions to questions during the marking process.

- 1**
- (i) Treasury bills, commercial paper, repos, agency securities, certificates of deposit, cash.
 - (ii) The main risk applying to the underlying assets will be credit risk. This is potentially significant as most money market assets are unsecured, although in most cases the assets will carry high credit ratings. Only repos are secured.

There is very little interest rate risk due to the short maturities involved (1 year or less typically), and most money market funds are not permitted to invest overseas so there would be no currency risk. Liquidity risk is also likely to be low.

(iii) **Portfolio level considerations**

A relatively high level of return is being targeted (CPI + 2.5% might be a nominal 5% at the present time, compared to a cash rate of 0.5% or less over the next year), so only a low allocation to low-risk assets such as government bonds and cash will be possible.

Conversely the volatility target is somewhat lower than equities (currently in the region of 20% for US equities) so a diversified strategy will need to be adopted.

From a liquidity perspective, there is considerable scope (50%) to invest in less liquid assets such as credit and alternative assets, although the most illiquid assets (private equity, infrastructure debt, loans) are limited to 20% of total assets.

Diversification across asset classes, and within asset classes (e.g. by industry / sector) is possible with the relatively wide asset class universe given, and should result in a lower portfolio volatility than the individual asset class volatilities might suggest.

Asset allocation

This would suggest an asset class along the following lines:

	<i>Allocation</i>	<i>Long-term return expectation</i>	<i>Volatility</i>
Equities and private equity	40%	CPI + 3.5 – 5.5%	16–22%
Hedge funds, property	10%	CPI+ 2.5 – 4.0%	10–12%
High yield bonds, loans, infrastructure debt	20%	CPI + 2.0 – 3.0%	6–10%
Investment grade bonds	25%	CPI + 1.0 – 2.0%	5–8%
Cash, government bonds	5%	CPI – 0.5%	1–2%
Total		CPI + 3.0% (taking midpoints of above ranges)	10.4% (pre-diversification effects)

Time to invest

\$100bn is a large sum to invest, and it will take time to get it invested. Investment will require appropriate managers to be hired internally or engaged externally.

There will need to be a transition plan coordinating large sums across multiple managers to ensure that asset purchases happen smoothly and without excessive market impact or transaction costs.

Equities and hedge funds will in most cases require a relatively short timescale to invest, although \$30bn (say) will require several months even for developed world large cap stocks and hedge funds. Emerging market and small cap equities will require a longer period for full allocations to be built up, potentially up to 1 year for a well balanced portfolio.

Private equity will require much longer timescale, extending over several years.

Cash will require very little time to invest in and can be built up over a few days although presumably there is significant disinvestment occurring under the transition plan as allocations of other asset classes are built up.

Corporate bonds, high yield bonds, loans and infrastructure debt (in order of reducing liquidity) will require several months to build up diversified allocations.

Correlations

In general the asset classes given will have two main risk drivers: equity and credit spreads.

Equity and credit are relatively correlated (e.g. 0.5, but with higher correlations at times of market stresses).

Hedge funds do provide access to other risk premia, but still have moderate correlations to equities and credit spreads (typically 0.3–0.5 but may increase to 0.4–0.6 at times of stressed markets).

Some diversification of risk premia is possible within the credit asset classes (investment grade bonds, high yield bonds, loans, infrastructure debt) but these classes will still be relatively correlated under large movements in spreads.

Infrastructure debt and private equity are likely to have less visible correlations with other asset classes due to their highly illiquid nature and the fact that they are likely to be valued on a mark to model basis and book value basis respectively. However the underlying correlations are still present and will become evident in the event of assets needing to be realised.

- (iv) The assets require a long time horizon due to the need to develop a plot of land (unless a mature plot is acquired), and the underlying investments can be highly heterogeneous.

These asset classes have relatively low correlations over short periods (e.g. one year) with most other asset classes as they are infrequently traded and do not have observable prices. Valuations are likely to be based on a multiple of the present value of the expected revenue stream, allowing for expenses, tax and underlying land values.

Over long periods there are likely to be correlations to GDP growth, inflation and property.

Hence despite the complexities of investing in these asset classes they can be useful in a diversified portfolio for a large investor.

- (v) These two asset classes require specialist expertise and knowledge of the underlying assets.

As such, both agriculture and timberland are likely to entail direct investments or use of specialist funds. This is likely to result in relative high direct or indirect costs compared to that required to invest in securities (e.g. equities or bonds).

- (vi) Divestment of \$50bn will require a significant transition plan and is likely to result in a degree of market impact.

The following assets could be realised from the above asset allocation:

Cash	\$5bn	Within 1 month
Large cap developed equities	\$25bn	Within 3 months
Small cap and emerging market equities	\$5bn	Within 3 months (half of total exposure)
High yield, loans	\$5bn	Within 3 months (half of total exposure)
Hedge funds	\$5bn	Within 3 months
Corporate bonds	\$20bn	Within 3 months (around 75% of total exposure)
Total	\$65bn	

The managers will need to be informed immediately and be subject to strict confidentiality undertakings.

Some of the mandates may be longer-term in nature with lock-ups or notice periods. This is particularly likely for emerging market equities, small cap equities, high yield bonds, loans, hedge funds, private equity, infrastructure debt.

Even some of the other mandates may permit the manager to apply a “gate” or reduce the pace of divestments on a discretionary basis.

Reaching the \$50bn target within 3 months will be highly challenging, and it would be advisable to arrange contingent financing in case this proves necessary.

For the longer-term transition it is unlikely that this will be possible within a 3 month timescale as the post-divestment portfolio will be relatively illiquid. A 6-9 month timescale is more realistic, although if markets are depressed would likely result in some level of market impact.

Futures overlays could be used for equity disinvestment, particularly if there are manager lock-up periods that would prevent equities being sold.

2 (i) The policy would be expected to cover:

1. The company's overall objectives probably relating to (avoiding detrimental impacts to) the profitability, balance sheet, cash flow or distributions coupled with the trustees' objectives to achieve full funding over a certain time period
2. Risk budget

Relating to the company's and trustee's specific objectives, which may differ, a specification of top level risk metrics and target

The policy may also cover permitted assets according to their return seeking (rewarded risk e.g. equity, credit, real estate) or risk reducing (for unrewarded risks e.g. Inflation, duration, longevity) characteristic

Would expect to see some statement of intent to remove/hedge unrewarded risk according to some measure of funding or market level parameter

3. Asset allocation

A statement as to which asset classes are not permitted

A statement as to any asset allocation limits or ranges

Within the bond portfolio there may be additional credit rating (average or minimum) boundaries as well as concentration limits for all assets

Could see explicit reference to Employer Related Investment regulation and restrictions if appropriate to the jurisdiction (or generally as a reduction in covenant risk)

A more detailed asset allocation benchmark would be detailed by the Scheme trustees in the relevant Statement of Investment Principles.

4. Liability hedging and transfer

Comment on target hedge ratios for certain risks e.g. rates, inflation and governance/execution process for implementation

Likewise the means of assessing and evaluating opportunities to transfer liabilities to third parties would be detailed

5. Liquidity

A process, frequency and targets for assessing liquidity requirements e.g. sufficient liquidity must be maintained to meet the next [6] months pension payments after a 1-in-20 stress on each asset class.

6. Counterparty

Detailed limits covering such areas as

- No more than £[x] exposure to any single counterparty
- [Any requirements for CSAs]
- Sufficient liquid assets should be held to meet [definition of example stress collateral scenarios]

7. Risk reporting and monitoring

Types and frequency of management information needed to facilitate the implementation of the pension risk management policy (this document) including

- i. Value at Risk on an IAS 19 and Funding basis
 - ii. A decomposition of Value at Risk by risk factor
 - iii. Interest rate and inflation sensitivities across maturities
 - iv. Stress scenarios on current asset allocation
 - v. Volatility of cash contributions
 - vi. Projected funding level distribution by target date
 - vii. Risk analysis of underlying active managers against their benchmarks
 - viii. Projected liquidity requirements and stressed scenario
 - ix. Projected collateral requirements and stressed scenario
 - x. Counterparty exposure
- (ii) Retrospective tracking error – (annualised) standard deviation of portfolio return relative to benchmark return. This is based on historic / observed returns

It is often useful to differentiate between downward and upward semi-standard deviation (by separating returns above and below the benchmark respectively).

Prospective tracking error – a forward looking measure of the risk of the portfolio relative to the benchmark, based on a quantitative model that makes

assumptions about the volatility of stocks or asset classes and correlations between them. Different models will have different levels of granularity.

Instead of using an asset-based benchmark, the benchmark can be set to be the total return on a pool of assets that are a close match for the liabilities, i.e. a liability proxy.

Then the retrospective tracking error would measure the magnitude of overall asset liability mismatches on a historic basis, and the prospective tracking error would measure the same on a forward looking (model) basis.

- (iii) The retrospective tracking risk measure compares actual returns to a benchmark proxy corresponding to the portfolio strategy over a prespecified data window.

Therefore it is only suitable for use under a broadly constant investment strategy, unless manual adjustments are applied or proxy data used. In this case it is likely that the measure will provide an incomplete risk measure. Particular problems arise in respect of derivative positions which may vary over time in terms of exposure and investments that adopt leverage, potentially on a variable basis. The more material such exposures are the less relevant this risk measure becomes, and in this case understanding tail risks will become much more important.

Determining the data window is problematical, as historic data may only go back a few years for some asset classes (e.g. certain credit assets, alternative asset classes), with longer datasets available for others (equities, government bonds, bills). With a highly diverse investment strategy it is likely that data availability will be an issue.

Whilst a long dataset will provide richer data on tail outcomes, tracking error does not consider this part of the return distribution so there may be little advantage in trying to extend the dataset.

A very short dataset is likely to lead to a less stable risk measure over time, whereas a longer dataset will lead to a more stable risk measure.

Regardless of the data window chosen, the predictive power of the measure is limited by the extent the future resembles the recent past.

The prospective risk measure potentially addresses a number of the above weaknesses through the application of judgement, at the cost of introducing subjectivity.

It permits a blend of short and long datasets to be applied according to the asset class.

Depending on the model structure, assumptions can be made about the linkages or dependency structures between returns on different asset classes, rather than relying on observed correlations.

This is particularly useful for new asset classes where there is little data, or where a leveraged strategy is being adopted where the long and short positions can be modelled separately.

Such an approach can also be adapted relatively easily to incorporate views on the short or medium term risk outlook, e.g. the model's calibration can be adjusted to reflect views on the likelihood of an outcome that may not have been previously observed such as the breakup of a single currency.

The major weakness of the prospective risk measure is the subjectivity introduced (there is no way of decoupling the views taken from the dataset), and the additional complexity of the approach. Potentially a large number of assumptions will need to be made, particularly if the model is highly granular. For these reasons many such models permit the use of empirical (historic) data alongside the subjective assumptions.

3 Bond Market

Monetisation of Debt (MoD) will increase the demand for bonds in the bond markets by the central bank – increasing bond prices and consequently lowering bond yields.

MoD would typically be used to impact the middle to longer end of the yield curve, which would not be directly impacted by more traditional monetary policy.

However, if the MoD results in higher inflation or higher inflationary expectations, it may increase yields at the longer end of the yield curve.

The government needs to maintain a sufficient amount of bonds being traded in the secondary markets to ensure continued good functioning of the market – as this is quite important for pension funds and insurance companies among others. This is unlikely to be a problem as the question implies there is excess government debt in the market.

Equity Market

If MoD reduces bond yields, this will both improve the relative attractiveness of equities compared to bonds, and also reduce the discount rate at which future earnings are discounted, causing the equity to move higher.

Equities are a real asset and may also move higher on higher inflation and/or the prospect of higher inflation, or the removal of deflationary expectations.

The new money may further add to the demand for equities, especially those with real revenue streams and with a large amount of real assets on their balance sheets.

Lower bond yields should lead to lower commercial interest rates which should stimulate economic activity, increase corporate profitability and future dividends, and thus raise equity prices.

The result of the MoD may have a disproportionate effect on the stock market in the short term, creating an imbalance in the economy and this can result in some degree of a stock market “bubble” unless the MoD results in a similar increase in the value of economic output.

If MoD results in investors being worried about inflationary expectations this would cause a stock market sell-off.

Exchange Rate

Initially the exchange rate should fall – unless similar or more severe MoD is happening in other countries.

Lower interest rates reduce the demand for the domestic currency.

Lower exchange rates should increase the competitiveness of all exports. This is despite increasing the cost of imported raw materials used in production.

Lower exchange rates should increase the relative competitiveness and demand for domestically produced goods and services stimulating domestic growth in the next two years.

Increased uncertainty about the economy will cause the exchange rate to fall, but if the market feels more confident about the country's economic growth prospects, then the exchange rate may rise.

Economic Growth

Lowering short rates encourages investment spending by firms, and increases the level of consumer spending.

There can be a considerable lag between lowering interest rates and a pick-up in growth.

Capital investment spending by firms increases employment levels and therefore incomes, but it takes time for firms to plan and build new production facilities before they start producing goods.

To increase consumer spending you need to do one or more of:

- Increase disposable income by reducing the cost of servicing existing debt – the effect will be more immediate if borrowing is generally at floating rather than fixed rates.
- Discourage savings and / or encourage spending of savings – lower interest rates provide less reward for savings, however, consumers need confidence (e.g. job security or prospects) before savings are turned to spending.

- Encourage personal borrowing – lower interest rates make borrowing cheaper, however, consumers need confidence (e.g. job security or prospects) before borrowing to spend.

The return of consumer confidence will take time to emerge.

If MoD results in other countries also conducting MoD to engage in competitive devaluations, this is likely to hurt international trade, and hurt economic growth.

Growth may increase due to “money illusion”.

Inflation

The increase in the supply of money, all else being equal, should increase inflation.

Lower exchange rates will increase the cost of imported goods and services leading to supply side inflation. The impact on the inflation rate will depend on whether these higher costs can be passed on to consumers. Weak demand and the pressure of domestic alternatives are a limiting influence.

The use of forward currency contracts will create a longer lag.

Lower real interest rates mean an increased quantity of money is demanded which is met by an increase in the money supply. This can lead to inflation (demand side). Demand side inflation typically has a longer lag than economic growth.

(Other sensible answers are also acceptable, especially comment concerning the generation of imbalances in the economy and the impact that this has on markets)

END OF EXAMINERS' REPORT