

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

April 2013 examinations

Subject ST5 – Finance and Investment Specialist Technical A

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 ST5

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 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 questions.

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 – it would seem that candidates have taken this on board.

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.

Comments on the April 2013 paper

This paper had a lower pass mark than the previous diet although perhaps more consistent with prior years given the pass rate. The examiners believed that the paper was of a comparable standard to previous exams but the examiners are looking for candidates to be better prepared, providing better content in quality and not just quantity so that both an increase in pass mark and rate is witnessed.

Candidates typically answered Question 5 and 6 much better than the others (albeit still foregoing 25–40% of the marks available), with Question 1 attracting the worst responses, considerably so, with average scores of around a third of the available marks. That said, some candidates did achieve nearly full marks on this question (and some achieved full marks on questions 6 and 8). Question 1 highlights a real challenge facing many institutions today and the need for pragmatism as well as theory so the average scores are disappointing.

Question 2 also looked at benchmarks and construction issues – benchmark risk, data management and the unintentional consequences they may have for successful investing is a challenge that investors are only really starting to appreciate properly. Question 3 looks at a particularly topical issue given the public scrutiny on lending to businesses and the role of credit agencies in the financial crisis and now, likewise Question 4 as many investors “search for yield”.

Questions 5 and 7 required a good knowledge of bookwork and its application, and so probably were the questions to differentiate candidates, whereas Questions 6 and 8 were fairly standard numerical calculations and high scores were to be expected.

Many questions represented opportunities to demonstrate higher level skills in terms of non-standard/practical application of theory to current or unusual issues in investment – candidates who wish to progress to SA6 will need to improve their understanding of and approach to such questions.

Most candidates seemed to identify and understand the key issues being examined and so appreciated the general content of solutions that the examiners were looking for – however those 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 alongside the approach outlined below.

- 1** (i) Ensure security by maintaining solvency coverage (in some cases allowing for planned future contributions to the fund)
Aim to generate long-term investment returns above the risk-free rate so as to reduce the size of required future contributions

The first of these objectives will encourage hedging of liabilities and holding low risk assets, whereas the second of these objectives will encourage holding more risky assets in pursuit of excess returns (and reducing hedging activity where there is a cost to hedging).

- (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 which assumes that the current structure remains unaltered and makes assumptions about the volatility of stocks or asset classes and correlations between them. Different models will have different levels of granularity.

Other measures that might be used include the Jensen and “pre-specified standard deviation” risk-adjusted performance measures. The information ratio also makes use of the retrospective tracking error.

- (iii) 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.

- 2** (i) Each football player is unique so no defined price

The market value of a footballer is only known when a trade takes place

Estimation of player value is very subjective

Valuations will be carried out at different points in time

The price at which the price is agreed between buyer and seller is often confidential.

Large number of players to assess

- (ii) Use a subset of players to reduce the amount of calculation required

Use valuation points where most transfers take place to get better idea of price inflation

Use a proxy increase rate where values are not known, such as inflation

Devise a pricing methodology based on some factors such as division play in, age etc.

- (iii)

Footy return	1.050	1.029	0.981	1.037	1.045	1.017	1.042	1.024	24.6%
Fund return	1.050	1.04	1.04	1.04	1.045	1.04	1.042	1.04	39.1%

- 3** (i) The fundamentals of the rating agencies' approach to rating companies will focus on:

- fundamental risks of the company's industry
- competitive position (relative to peers)
- downside risk vs. upside potential
- quality of profitability vs. EPS growth
- cash flow generation vs. book profitability
- forward looking analysis
- strategy, management track record and risk appetite
- capital structure and financial flexibility

- (ii) Increase in defaults from companies taking loans

Likely to be poorer quality companies looking for funding

Maybe fewer loans being taken as companies decide to exit business or not finance expansion like previously

Quality of data from rating agency. In fast changing credit situation then ratings could be behind cycle.

- (iii) Ask for additional security in event of default

Only lend to sectors that expect to do well or not decline significantly during recession. Thus diversification would be sensible.

Use different analysis to rate clients rather than using credit rating agency
May need to offer more competitive rates to take higher proportion of a smaller market.

Use credit derivatives to mitigate risk.

Securitise the loans (to transfer risk to other investors).

4 (i) Alternative bond-like assets include:

- Agency bonds – bonds issued by government-sponsored agencies e.g. nationalised industries and local authorities (in the UK) or Federal Mortgage Associations, states and counties and school boards (in the US).
- Investment Grade Corporate bonds, preference shares and debentures – bonds rated at least Baa (by Moody's) or BBB (by Standard and Poor's)
- High Yield bonds – bonds rated below investment grade
- Convertible bonds – bonds that may be converted into equity at a later date
- Distressed debt – securities of companies or government entities that are either already in default, under bankruptcy protection or in distress and heading for bankruptcy
- Event linked bonds – bonds with coupons and redemption payments conditional on the non-occurrence of a defined event (such as an earthquake)
- Interest rate and inflation swaps – swapping fixed payments on a notional principal for payments linked to market interest rates such as LIBOR or an inflation index
- Credit default swaps – contracts that provide a payment if a specified credit event occurs
- Mortgage Backed Securities (MBS) and Asset Backed Securities (ABS) ("Securitisations") – bonds that are serviced and repaid exclusively out of a defined element of future cash flow from a bundle of assets owned by the issuer
- Infrastructure assets – debt serviced from the cash flow generated by an infrastructure project

(ii) The above assets could exhibit gains or losses relative to government bonds due to one of the following factors:

- Divergent yields between low risk assets (e.g. high quality government bonds) and risky assets (e.g. credit, equities), e.g. "flight to quality" or a risk assets rally
- Asset class specific factors (e.g. general rerating of a single asset class)
- Issuer or security level factors (e.g. the downgrade or default of an issuer)

Particular risk factors for the above asset classes include:

- Prepayment risk – MBS, ABS, Agency bonds have incentives for borrowers to bring forward payments on the underlying loans (e.g. falling interest rates and ability to refinance at a lower rate)
- Changing views on probability of default – can impact at an issuer, sector or asset class level
- Changing views on recovery after default (or loss given default) – can impact at an issuer, sector or asset class level
- Illiquidity risk (if the terms of the bonds are different to government bonds)

5 (i) A contango market is a commodity futures market where the futures price normally exceeds the spot price. This is usually because the cost of carry (the financing cost of holding the underlying commodity, plus storage costs) is positive and $\text{future price} = \text{spot price} + \text{cost of carry}$.

(ii) Crude oil – in recession there is less demand for oil which reduces output. Reduced output and weakened demand have negative impact on price therefore, decreasing cost of commodity

Gold – during a recession gold is often regarded as a safe haven for investors. Therefore, the demand for gold usually increases, resulting in the value of gold commodities to rise.

Pork bellies – during a recession then people start to switch from expensive foods to cheaper foods. Pork bellies are a cheaper meat and it is likely that people will switch from more expensive meats therefore, leading to a moderate rise in pork belly prices

(iii) The principal benefits of alternative investments are:

- Potential for higher returns, possibly from increased beta, market inefficiencies, pricing anomalies or the skill in selection / management of the investor.
- Diversification due to a lack of correlation with existing assets or by exposure to underlying risks that are uncorrelated so reducing the overall portfolio risk.

(iv) Should an investor wish to gain exposure to commodity price movements it can do so in three ways:

- Invest in the underlying commodity (or basket of commodities)
- Commodity derivatives (on either single commodities or an index) which are widely traded on major exchanges such as Euronext.liffe and the Chicago Mercantile Exchange.

- Invest in companies whose share price is influenced by commodity prices (such as oil and mining companies).
 - Invest in a commodity fund offered by an investment manager.
- (v) Comment on management costs and skills, minimum bargain size, scope for diversification, basis risk with derivatives, volatility, liquidity and physical settlement / storage / shipping / transportation.

Holding individual contracts introduces risk of being delivered against .

Disadvantages if companies are used as a proxy for commodity investment:

- It is unlikely that there will be exposure to just one commodity.
- The company's management may alter the exposure via acquisitions or disposals or by hedging its position .
- The company's share price may be influenced by other factors.
- The company will incur various operating expenses which will dilute overall return.
- Use of commodity shares (mining, exploration companies) gives less diversification from equity market than physical would.

Investment management commodity fund

Advantage: access to specialist management, liquid, small universe, etc.

Disadvantage: High management fee, excessive sector concentration.

- 6** (i) The formula to obtain a total return index at time t is:

$$TRI(t) = TRI(t-1) \frac{I(t)}{I(t-1) - [XD(t) - XD(t-1)]}$$

where $TRI(t)$ is the total return index, $I(t)$ is the capital index at time t , $XD(t)$ is the value of the accumulated XD adjustment at time t .

- (ii) $TRI(\text{Day } 2) = 4080.63 \times 5774.20 / (5857.52 - [170.85 - 168.82])$
 $= 4023.98$
- (iii) Dividend yield = $(170.85 - 168.82) / 5857.52$
 $= 0.0347\%$ per day, or 13.5% p.a.

7 (i) Advantages:

The simplified approach reduces the likelihood of contributors making poor savings choices. This is particularly the case for less sophisticated contributors, who might be overwhelmed by the large ranges of funds offered by competitors.

There are significant cost savings under such an approach, due to low distribution costs and by eliminating third party asset management (e.g. specialist funds, ETFs, hedge funds etc.). The transparent charging structure is likely to be attractive as is the absence of any penalty if funds are subsequently transferred to another provider.

It is likely that investors will need less advice to manage their pension plan.

The diversified growth fund permits access to expert investors who can allocate to new asset classes, apply tactical asset allocation skills and stock / sector selection skills.

Not all of these asset classes may be available on competitors' platforms.

Disadvantages:

Some potential customers will prefer to invest with a more traditional provider who operates a number of different investment funds that they can choose to invest in.

There is a high level of trust required that the provider will invest assets appropriately, and have strong investment capability in all asset classes, and be able to add value through access to expert investment views (TAA, alpha, new investment strategies, etc.), since it is not possible to select an alternative asset allocation.

The provider has no track record for these funds in their current form.

The customer will need to be confident that the low fee scale will be maintained over time and that other expenses and costs will be managed appropriately.

Customers will need to be confident that the provider's approach will scale, otherwise active returns may weaken as assets under management grow.

(ii) So long as the provider has a good understanding of liquidity requirements, inflows and outflows, a diversified approach is straightforward to manage.

Significant outflows can cause particular difficulties due to 40% of the assets being highly illiquid, with corporate bonds having poorer liquidity than equities.

In the event of significant disinvestments this is likely to lead to the asset allocation moving above its desired allocation to illiquid assets.

A further complication is that with customers able to invest and disinvest according to their own choice, it may be difficult to fairly allocate returns on long-dated investments (e.g. private equity and infrastructure) to customers.

Sudden inflows may mean that assets are held in cash pending identification of suitable investment opportunities. This is unlikely for equities and investment grade corporate bonds but is a possibility for alternative assets, high yield and asset backed credit.

Finally, the provider will need to ensure that its investment process scales appropriately as assets under management grow. This is particularly the case with regards to identification of alpha opportunities, new asset classes and tactical asset allocation shifts.

- 8 (i) If R_1 and R_2 are the zero-coupon rates for maturities T_1 and T_2 respectively, and R_F is the forward interest rate for the period between T_1 and T_2 , then

$$R_F = \frac{R_2 T_2 - R_1 T_1}{T_2 - T_1}$$

- (ii) $\delta_1 = 0.05$, $\delta_2 = 0.055$, $T_1 = 0.25$, $T_2 = 0.5$

$$R_F = 0.06$$

The quarterly- compounded rate is then given by $4[e^{0.06 \times 0.25} - 1] = 0.06045$

The value, V , of a FRA where it is specified that an interest rate R_K will be earned for the period of time between T_1 and T_2 on a specified principal of L can be evaluated as:

$$V = L(R_K - R_F) (T_2 - T_1) e^{-R_2 T_2}$$

$$\begin{aligned} \text{So } V &= 1,000,000 \times (0.07 - 0.06045) \times 0.25 \times e^{-0.055 \times 0.5} \\ &= \$ 2322.74 \end{aligned}$$

END OF EXAMINERS' REPORT