

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

September 2010 examinations

Subject ST5 — Finance and Investment Specialist Technical A

Introduction

The attached subject report has been written by the Principal Examiner with the aim of helping candidates. The questions and comments are based around Core Reading as the interpretation of the syllabus to which the examiners are working. They have however given credit for any alternative approach or interpretation which they consider to be reasonable.

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Chairman of the Board of Examiners

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General comments

Pleasingly, this diet reversed the trend and was a much better answered paper than previous diets resulting in a higher pass rate even with a higher pass mark. Candidates typically answered Questions 1 and 6 much better than the others (albeit foregoing a lot of marks), with Question 2 and 4 attracting the worst responses, considerably so, with average scores of less than 30% of the available marks and given the fairly basic subject matter, this was something of a surprise. Indeed questions 3 and 9 were little better answered and in question 3, candidates continued to demonstrate difficulties with accounts based questions, a fairly fundamental area of investment analysis. Questions 5 and 8 represented opportunities to demonstrate higher level skills in terms of non-standard/practical application of theory to current or unusual issues in investment – hence candidates who wish to progress to SA6 will need to improve their understanding of and approach to this type of question.

That said, 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. Many candidates 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 including a meeting convened to review a common "test batch".

Some candidates believed that parts of Q7 were asking for the same information twice - this was not the intent of the examiners but in order to treat all candidates fairly, the second part was question was discounted, although all relevant points in either section were given credit for and the overall marks scaled up accordingly.

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.

As noted in previous reports, 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, more so the solutions (and sources of) being debated by the various stakeholders. A recurring theme in recent years has been a move towards capital market and corporate finance rather than purely insurance and asset management solutions – hence questions regarding banking and derivative approaches to asset and liability risk management or modern financial theory and commercial applications 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 operations, liquidity, credit and counterparty), so the need for new ways of regulation, monitoring and management. Finally the examiners encourage candidates to recognise there are different types of investor beyond purely pension funds and different taxation, time line and cost considerations will apply.

- 1** ALM is increasingly associated with stochastic modelling (although deterministic methodologies can be used).

The main stages in an ALM exercise are usually as follows:

1. The key objectives that investment and funding policy should aim to achieve need to be clarified. These involve objectives such as:
 - future on-going funding levels
 - future solvency levels
 - future company contribution rates
2. Suitable assumptions to use in the study need to be agreed.
3. Data needs to be collected to carry out the projections.
4. The overall nature of the liabilities is considered – a broad-brush analysis of current funding level, maturity and cash flow.
5. An analysis would be carried out to identify how the scheme might progress in the future if different investment strategies were adopted. It would also be appropriate to test the sensitivity of the results to different parameter assumptions.
6. Different asset mixes would then be analysed in more detail to assess the risks (relative to the liabilities) and the rewards of each alternative under consideration.
7. The results would be summarised and presented.

ALM will often be used in a “control cycle” context that involves monitoring the experience and revisiting earlier stages of the process.

- 2** The net asset value of a company, or the net asset value per share, is clearly only one component of overall value. So, if other things are equal, a share with a higher proportion of its share price represented by net asset value should be cheaper than a share that has less asset backing.

However other things are unlikely to be equal as the market will, in both cases, be attaching a full value to all future cash flow, including that resulting from holding all existing assets and liabilities.

The net asset value is, in the end, an accounting number, so it is important to understand how it has arisen and to make appropriate adjustments. For example, property or other non-quoted assets may be difficult to value.

For example, a company that has expanded by acquisition will have acquired goodwill on its balance sheet which will form part of its net asset value. A similar company that has only grown organically will appear to have a lower net asset value

per share. Generally, goodwill will have to be evaluated for relevance and removed if appropriate in order to make valid comparisons.

Some businesses require more assets than do others. For example a manufacturing business will generally require plant, premises and stock whereas a service business will typically require less assets. Comparisons of net asset value between companies in different sectors will inform only about the difference between the sectors. Some assets are more intangible/harder to value. "Human capital" i.e. an asset of service companies is rarely included in NAV.

Net assets surplus to those required to run the business may not attract full value. It is usually regarded as inefficient for a company to hold surplus assets, and also it is harder to maintain management discipline when there is a substantial asset cushion.

Net Asset Value will not reflect risk

Points in favour include the fact that NAV is

- readily available
- objective
- independent
- auditable
- relevant for break-up

3 The main observation is that the benefits payable are greater than the investments and other income. All outgoings are increasing, all incomings (except Contributions) are falling. This suggests that either one or more of the following:

- The scheme is very mature and/or the scheme is being run-off/wound down. It will be necessary to consider the extent of any existing overfunding / surplus and how this is being drawn down.
- The scheme's assets are underperforming to expectations by a large percentage.
- The scheme is underfunded and liabilities are significantly in excess of the assets. It will be necessary to consider the degree of employer covenant and how the underfunding might be made good.

Credit was given for other appropriate comments.

- 4** (i) Value at Risk is a measure of the maximum loss that might be suffered on a portfolio or a holding in a specified timescale and with a specified probability. As such, it is a measure of Market Risk – the risk relating to changes in the value of a portfolio due to movements in the market value of the assets held.

- (ii) Given an annualized volatility of 15%, the daily standard deviation is $0.15/\sqrt{250}$ (assuming 250 trading days in the year). Thus the VaR is given by

$$20000 \times 1.6449 \times 0.15/\sqrt{250} = \text{£}312.10$$

(Alternatively, if we assume 365 days in the year, the daily standard deviation is $0.15/\sqrt{365}$ and the VaR is

$$20000 \times 1.6449 \times 0.15/\sqrt{365} = \text{£}258.29$$

(Credit was given for any sensible number of working days given international variations.)

- (iii) VaR calculated using the assumption that stock log returns are distributed normally is found to be an underestimate in practice. This is because short period stock returns show a more fat-tailed distribution.

The assumption of normality also implies that stock returns are symmetrically distributed. In practise, return distributions may be skewed.

The calculation assumes that the past experience will be maintained, whereas the future probability distribution may well be different (particularly regarding volatility).

The VaR figure, once calculated, does not say anything about how bad losses could actually be (and definitely does not specify the worst possible loss).

As a risk measure, VaR has poor aggregation qualities. The VaR of a merged portfolio may exceed the sum of the VaRs of the individual portfolios depending on correlation/(lack of) diversification considerations.

VaR ignores any problems relating to market liquidity.

There is no single optimal choice for the time horizon and confidence level at which to calculate VaR.

VaR is often not well understood and so applied (especially on the retail side).

- 5** (i) Attitude to risk of the islanders, particularly the investment risk of investing in different asset classes.

Time preference and consumption needs of the islanders. Preferred retirement age.

Existing assets of islanders; and disposable income available for savings.

Need for diversification

The islanders needs/preferences between the need for income or capital growth. Inflation / growth protection requirements

Tax position of the islanders

The level of provision the islanders need/want in retirement

Flexibility of contributions.

- (ii) The fisherman is adventurous so he is likely to have a higher than normal acceptance of risk so he is likely to invest in higher risk asset classes such as equities, hedge funds (or any other sensible suggestion)

He is young so has a long way to retirement so is more than likely to be happy to have assets invested for a long time and therefore can accept risk, again equity type exposure is probably appropriate.

He earns a low salary so is unlikely to have any existing assets. If he wants to build a level of assets quickly he will invest in higher return seeking assets such as equities. However, if he is concerned that he wants to maintain the minimal assets he has then he is more likely to invest in more stable assets such as bonds or cash.

Tax position – he will want to try and minimise tax and therefore look for assets that have lower tax implications. The asset class will be dependant on the tax rules for the various asset classes.

If we assume the fisherman wants as much as possible in retirement then he will opt for higher growth assets such as equities, however if he wants more certainty over the level of benefits in retirement then would invest in less risky assets such as cash and bonds.

Within each asset class, it will be appropriate to diversify the holdings.

(Credit was given for other relevant comments)

6

(i)

- Management ability
- Management experience in running businesses overseas
- Quality of products
- Prospects for growth, especially in overseas market
- Competition both in domestic and overseas market
- Input costs
- Retained Profits

- History of company
- Existing borrowing/capital structure

(ii)

- The financial accounts and accounting ratios
- Dividends and the earnings cover
- Profit variability and growth
- Level of borrowing
- Level of Liquidity
- Growth in asset values
- Market / market potential
- Logistics required
- Personnel availability (employment levels, etc.)
- Competitor analysis i.e. comparative figures for other similar companies

(iii)

- Is there demand for the pizza?
- Are there local differences in preferred pizzas
- Lack of brand recognition
- Language barriers?
- Any legal or regulatory constraints?
- Logistics including where will ingredients/personnel be sourced from
- How will new overseas department be structured
- Financial management e.g. currency
- Any other sensible suggestions

7

- (i) WashCo – Classical tax system where profits are taxed twice – once in the hands of the company and once in the hands of the investor.

CleanCo – Split-Rate tax system where retained and distributed profits are taxed twice but at a different rate.

SpinCo – Imputation tax system where the company has to deduct some of the tax payable by investors on distributions and pay it direct to the government.

- (ii) WashCo – £30m in company tax and £12m for dividends = total £42m, 42%

CleanCo – £25m in company tax and £3m for dividends = total £28m, 37%

SpinCo – £10m in company profits and £10m in dividends = £20m, 40%

- (iii) WashCo = 30%
CleanCo = 33%
SpinCo = 40%

WashCo profits have the highest overall tax burden but the company burden is the lowest of the three companies.

The highest tax percentage is for WashCo, however the total tax payable is split at the same rate between the company and shareholders. Spin Co has the lowest rate of company tax but when combined the amount payable on distributed profits the tax is the highest of all three, and as a company the tax payable is the highest of all three.

- (iv) The new entity would want to be in the region where they pay the lowest tax rate. Although WashCo profits have the highest total tax, the burden on the company is the lowest so you would recommend to the board of directors that the new entity remained in the original country. However, if shareholders interests were to predominate, the company should locate where CleanCo is located as the total tax paid on profits and dividends is the lowest.
- (v) How stable are the taxation rates, are they likely to change in the future? Are there any tax reliefs available in the countries that would reduce the tax bill, i.e. carry over previous losses.

The timing and frequency of the tax payment, does it all need to be paid at once?

Their own holdings in the company which will effect their tax payments.

The tax treatment of “international” transactions i.e. double taxation agreements or the application of transfer pricing policies

- 8** (i) **Anchoring** – this is the term used to refer to the fact that people base their views of the likelihood of an event on recent experience.

Dislike of negative events – the degree to which an outcome is considered negative or positive has a significant influence on an estimate of its likelihood. In general, people are optimists and overestimate the likelihood of positive events.

Representative heuristics – people find more probable that which they find easier to imagine.

Availability – people are influenced by the ease with which something can be brought to mind. This can lead to biased judgements when examples of one event are inherently more difficult to imagine than examples of another.

- (ii) Individuals are typically **overconfident** about their own skills and insights. Overconfidence arises from:

Hindsight bias – events that happen will be thought of as having been predictable prior to the event, events that do not happen will be thought of as having been unlikely prior to the event.

Confirmation bias – people will tend to look for evidence that confirms their point of view (and will tend to dismiss evidence that does not justify it).

The discrepancy between confidence and accuracy increases as an individual's expert knowledge increases (even where accuracy improves with knowledge, confidence increases by more).

Option issues such as regret aversion may also be relevant.

- (iii) (a) Anchoring – although the data shows that capital appreciation is unlikely to continue, the investor is anchored that history will repeat itself and therefore experts opinion is not given due consideration.

Overconfidence – past evidence of the investor's ability to make money means could have become overconfident in his own abilities.

- (b) Hindsight bias – Events that happen will be thought of as having been predictable prior to the event, i.e. re-evaluating past evidence to prove the scenario was always likely to occur.

- (iv) Regret aversion – by retaining the existing arrangements, people minimise the possibility of regret that new policy is not as good as current one.

Ambiguity aversion – people pay premium for rules. Here the policy schedule is unclear for the lower premium and therefore pay premium to receive more detailed rules of existing co.

Status Quo bias – people have a preference to keep things as they are.

Representative heuristics – as the amount of detail increases, its apparent likelihood may increase.

- 9** (i) Considerable teamwork required by UK and US fund managers to ensure that the switch goes smoothly. Very time intensive.

US fund manager can only buy as much as UK fund manager can sell at any one time.

May take some time for both managers to formulate their buy and sell programs.

May take time for UK to physically sell some of their stocks. Trying to sell stocks aggressively may result in poor prices being obtained.

Similarly aggressive buying by the US manager may well result in poor prices being obtained.

These problems are particularly acute when unmarketable securities are involved or where the normal market size for deal in the securities is small.

Costly – two sets of commissions and two spreads to be paid.

No mention if switch is strategic or tactical – if tactical may well have to reverse position in the near future.

The possibility of the crystallisation of capital gains leading to a tax liability.

- (ii) UK fund manager simply sells a number of futures contracts whose exposure is equivalent to the amount of stock needed to be sold and US fund manager buys a number of futures whose exposure is equivalent to the amount of stock needed to be bought.

Decision is implemented immediately.

Futures markets very liquid – little risk of price drag.

Purchase of futures gives fund managers time to construct and execute their buy/sell programs. As more stock is bought (sold) so the requisite number of futures can be sold (bought back).

If decision is tactical the positions can be more easily and cheaply reversed out of without harming the underlying stock portfolios.

- (iii) Value of one contract is $500 * 800 = \$400,000$
No of contracts $400,000,000 / 400,000 = 1000$
- (iv) Telecommunications exposure = $(500 * 0 + 400 * 18\%) / 900$
= 8% or \$72 million
- (v) Look at main constituents of S&P500 Telecommunications sector. To completely negate telecommunications exposure:

Sell stocks constituting the sector short (if allowed to) equivalent to the new exposure of the \$900m fund.

Buy put options on the stocks in the sector again equivalent to the exposure.

Could just do either of the above with a representative group of stocks to reduce the complexity of the transaction.

Sell futures on traded Telecommunications indices – this would introduce some element of mismatching risk.

Enter into an OTC swap transaction to exchange Telecommunications returns for some other suitable sector. Introduces counterparty risk.

- (vi) If the investment is via futures, it may be that only the margin is exposed to the dollar anyway. If have full exposure, then sell forward currency contracts equivalent to half of the fund's value.

Such contracts are short term and need to be rolled over (though not a problem here).

To precisely keep one half of the fund exposed to the dollar, need to know the value of the fund on the expiry/sale of the contract. This is unlikely, so some estimate of fund's future value required.

Hedging small amounts such as dividend receipts will be costly. However, would have to ensure that exposure to US market is still maintained after reducing telecommunications exposure.

END OF EXAMINERS' REPORT