

# **EXAMINATION**

April 2007

## **Subject SA6 — Investment Specialist Applications**

### **EXAMINERS' REPORT**

#### **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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## Comments

*Generally candidates scored better on question 2 rather than question 1, with the best candidates achieving two-thirds of the available marks. Although it was pleasing to see the scores achieved by better candidates, it continues to be a source of frustration and disappointment that the majority of candidates appear to ignore valuable information contained within the questions and lose easily achievable marks as a consequence.*

*In every diet there will be candidates who are very close to the pass mark and yet receive an FA — indeed I suspect candidates would be very surprised to see just how tightly distributed the marks are; deciding where the pass mark falls will have a material impact on the numbers of candidates who are successful and the examiners take great care to ensure a consistency of standard across candidates, subjects and diets. The pass rate for this diet was slightly lower than the last session although the pass mark was lower. Although most candidates were able to reproduce the required bookwork, the low pass mark reflects an inability to apply the bookwork knowledge appropriately.*

*All extenuating and mitigating circumstances were considered in awarding grades — coincidentally those candidates who had submitted the most severe mitigating arguments had in fact achieved sufficiently high marks to justify a Pass grade.*

*Candidates should note the 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. It is not appropriate to repeat all relevant material within the Core Reading and in the exam creation process, the profession takes great care to ensure that the paper can be answered by a candidate who has taken a “normal” route through the exams — indeed questions have been removed from previous draft papers as a result. 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 practising actuary in what is a frequently evolving discipline. Hence simple regurgitation of bookwork will not be sufficient to ensure a Pass grade. Candidates should ensure they familiarise themselves with the current investment issues facing institutional investors in the 18 months preceding a diet and the solutions (and sources of) being debated by the various stakeholders. A recurring theme in recent years has been a move towards capital market rather than purely insurance and asset management solutions — hence a question regarding banking and derivative approaches to asset and liability risk management should be considered a reasonable framework for examination.*

- 1**
- (i) (a) Vanilla meaning the most basic form of swap.
- (b) Some sort of diagram showing bank being paid fixed in return for floating and with counterparty on the other side.
- (ii) A fund of assets has been set up due to the existence of liabilities (rather than some other reason)  
Liabilities influenced by rates, inflation and longevity  
Regulatory, accounting and risk based levies are encouraging “derisking”
- One way to address risk is to build a liability-matching portfolio using suitable bonds. However, the bond market does not offer sufficient maturities to be able to match a pension fund’s annual liability profile. The result is a very staggered profile, leading to considerable reinvestment risk.
- Constructing a portfolio of swaps greatly diminishes the mismatch risk regardless of what happens to rates. In this way, the fund could meet its future pension obligations with a high degree of certainty.
- More importantly, the size of any deficit is quantified and stabilised so creating the scope for using a structured approach or active asset management approaches to repair the deficit within a finite term whilst eliminating uncertainty in corporate reported earnings.
- The Trustees may be interested in taking out an interest rate swap to reduce risk,
- or
- swap market might offer better value than physical due to demand/price anomaly
- or
- An overlay strategy may be desired to temporarily alter the asset allocation of the portfolio
- (iii) **Non-bond portfolio**
- Active management risks — risk of actively managed assets underperforming relative to the benchmark index for the asset class
- Strategic (asset class vs liability) risks — the risk of investment returns on the asset class (equities, real estate) not being in line with the increase in liabilities.

### **Bond portfolio**

Active management risks — risk of actively managed assets underperforming relative to the benchmark index for the asset class

Strategic (asset class vs liability) risks will be much lower than for the non-bond portfolio due to the swap overlay which removes first order interest rate and inflation risks.

Residual strategic risks will include:

Basis risk — the risk of the swap values not moving precisely in line with the assets used to derive the discount rate used to measure the liabilities.

Cross hedging risk — as an overlay approach has been used, if the bond assets held are different to that assumed in the overlay (as is likely for any actively managed bonds) this will lead to cross hedging risks as the bond values will move differently to that assumed in the overlay design.

Curve risk — unless a precise cashflow matching approach has been adopted in the swap design this will lead to a further cross hedging risk on the swap overlay.

Liability risks — this is similar to basis risk in that the cashflows used to define the hedge profile may be revised at future actuarial valuations as new information about demographic trends and scheme-specific experience emerges.

Liability risks arise both from changes to valuation assumptions and variations between experience and assumptions.

- (iv) By adding new asset classes with low to moderate correlations with the existing asset classes, a portfolio can be constructed that has lower risk than the existing portfolio.

This is even the case if the new asset classes are of similar volatility to the existing asset classes...

...due to volatility of a portfolio of weakly correlated assets being lower than the individual volatilities of the asset classes.

Many alternative asset classes have a lower expected return than equities, however.

Whilst this will lead to a higher Sharpe ratio (or information ratio), it will lead to a lower expected return for the non-bond portfolio.

- (v) Over long periods of time, the largest source of variation in funding level is likely to arise from the volatility of return for the non-bond portfolio.

This reflects that some 60% of liabilities are already closely hedged (subject to basis and cross hedging risks, but these are likely to be small in magnitude).

Putting a swap overlay over the non-bond assets will replace the existing liability return target (a mixture of the returns on perfectly matching fixed interest and index-linked bonds) with a target return expressed in terms of short-term interest rates (LIBOR).

The key risk from a funding perspective is therefore the risk of equities and property underperforming a LIBOR-related target (e.g. LIBOR + 2–3% p.a.).

Due to the volatility of equities (typically 15-20% pa) there is a significant risk of a large variation in funding levels from year to year in the event of an equity market crash.

In contrast, a diversified non-bond strategy will lead to a lower variation in asset values from one year to the next although the underlying interest rate and inflation risks are not hedged.

Whilst the interest rate and inflation risks do lead to some volatility in funding level it is likely that the latter approach would lead to a lower level of funding level variation than the former approach.

This argument assumes that in the short term equities are more volatile than a portfolio of matching bonds.

- (vi) (a) A dynamic liability benchmark relates to when an investment mandate is varied according to the changing nature of the liabilities. Essentially instead of a fixed benchmark (say 30% UK, 20% O/S, 50% bond based benchmark), the manager would be set a performance target which would vary depending on the liabilities. This could be set based on the actual liabilities and constantly reset to changes in the underlying liabilities, a least risk portfolio basis (e.g. 30% fixed interest, 70% ILG) or a broad brush approach taken, i.e. to beat RPI by 2%.
- (b) They are appropriate for pension schemes who wish to more closely align the performance of the assets with the liabilities. Due to the complexity and the time required to ensure that the benchmarks are appropriate they would normally be more suitable to Trustees with a high degree of financial knowledge and time to monitor/change the benchmark. Also, more appropriate for a well funded pension scheme, or one with strong sponsor. Underfunded scheme may need to take equity risk and therefore, not appropriate.
- (vii) If the economy is moderately buoyant and profits are fairly stable, both defensive and cyclical companies might be similarly rated in terms of the P/E ratios.

As the economy starts to move into recession P/E ratios for cyclical companies are likely to fall while those of defensive companies will remain stable or may even rise slightly.

At the bottom of the cycle P/E ratios of cyclical companies will probably have risen from their low point as earnings have fallen, but defensive stocks will still be more highly rated.

As the economy starts to recover, the P/E ratios of cyclical companies will rise in anticipation of future earnings growth. P/E ratios of defensive companies may now be lower than those of cyclical stocks.

As growth continues, the earnings of cyclical companies will catch up with the share price and P/E ratios will fall back towards their long-term average level.

- (viii) Sell UK equities — costs involved, loss of beta return and alpha return  
Hedge using future contracts — basis risk, cross hedging risk  
Options based strategies to limit downside risks
- (ix) Whilst it is correct that longer-term liabilities are likely to be less certain, and that liability risk factors are (in most cases) unhedgeable, there is still significant merit in managing investment risk factors.

These risk factors will include asset risks and interest rate or inflation risks, which this strategy has been designed to manage to a particular level.

The liabilities are calculated by reference to a bond-based discount rate. Assuming the liability calculation method does not change, the liability value will move in response to changes in the levels and shapes of the interest rate and breakeven inflation curves.

However hedging the first 50–60% of liability cashflows is unlikely to achieve a significant risk reduction compared to that achieved under the new strategy. This reflects that the later cashflows, although smaller in present value terms, contribute significantly to the interest rate sensitivity.

This can be seen if one were to analyse the sensitivity of the liabilities to interest rate movements, for example showing the PV01 (change in liabilities for a 1bp movement in interest rates).

The chosen hedging approach is not unique, and other hedging profiles could be created that would achieve a comparable risk reduction.

Also, it would be possible to hedge a smaller or larger proportion of interest rate and inflation risks than the 60% adopted under this strategy.

- (x) To target a particular level of risk reduction, any potential strategy will need to consider the following risk exposures:
  - Active management risk
  - Asset risks relative to either the unhedged liabilities, or to a short term cash (e.g. LIBOR) benchmark if the liabilities are hedged
  - Interest rate and inflation risks
  - Longevity risk

Total risk will be a combination of the above risks.

Other risk reduction techniques will include:

- diversification of the portfolio through inclusion of asset classes with low correlations to existing assets.
- equity option or swaption strategies that limit the maximum loss that could occur due to falls in asset values or falls in interest rates respectively.
- dynamically altering the asset allocation in response to changes in risk expectations across various asset classes.
- insurance/risk transfer techniques, such as mortality hedging.

- 2** (i) The investigations that should be carried out are as follows:

### **Past performance**

Past performance relative to the appropriate benchmark.

Use rolling 3-year returns as a good indicator of fund management ability, and compare this with other large investment managers.

Compare the volatility of performance relative to the benchmark and other large investment companies — this is a good indicator of the risk profile of the Investment Company.

In-house volatility — we would look at the dispersion of returns achieved by the Investment Company for portfolios with similar mandates to the pension scheme.

Ideally one would wish for a small dispersion thus implying consistency.

Attribution analysis — analyse the performance relative to its benchmark into asset allocation, sector allocation, stock selection etc., and compare this against the investment managers stated objectives.

Portfolio style analysis — Analyse the makeup of your scheme's stock portfolios to make sure the style is consistent with that stated.

### **Quality of Investment process**

The decision process must be effective and allow the views of key people in the Investment Company to influence portfolio construction in a manner appropriate to the style. The quality of research carried out by the organisation will have a major influence on the results as will the ability of the organisation to translate paper decisions into real portfolios at the best price.

### **Suitability of Risk Controls**

Analysis of risk controls implemented by the Investment Company.

## **Client relationship**

The quality and speed of delivery of the quarterly investment reports is a good indication of the efficiency of the Investment Company's mid and back office.

## **People**

The ability of the Investment Company to attract and retain key individuals is a major determinant of quality.

## **The quality of senior people**

- Experience
- Track record
- Commitment to the business

Depth of resources — the number of investment staff involved for each major sector, systems at their disposal, the dependence on any "star" fund managers.

- (ii) The amount of the bulk transfer is linked solely to the level of the market for UK equities.

The fund is invested across a range of asset classes in accordance with a set benchmark distribution.

Unless the proportion of the benchmark allocated to UK equities explicitly allows for this bulk transfer, part of the bulk transfer liability is effectively mismatched by asset class.

There is no particular advantage to the existing or receiving scheme from this proposal.

This could go either way and the size of the potential disparity will depend on:

- The length of the period between the assessment date and the payment date
- The assets held by the existing scheme

If for example, the portfolio is 50% invested in UK equities and 50% in overseas equities, bonds, properties etc., then circa £100m of the bulk transfer is matched by asset class.

However, there is still a circa £50m liability linked to UK equities which will be settled by transferring securities to the requisite value from the overseas equities, bonds, properties etc. classes i.e. this £50m is mismatched by asset class.

- (iii) You may be able to reduce your exposure to these other asset classes and increase your exposure to UK equities by using financial futures.

In total, you need to change your exposure for approx. £50m i.e. sell £50m worth of futures on these other asset classes and buy £50m worth of UK equity futures.

A variety of futures would be sold related to the markets in the other asset classes and in proportion to the distribution of the assets amongst these markets.

At the time of payment the futures position would be unwound.

The principal problem is that there may not be appropriate derivative contacts for some of these other asset classes e.g. property, venture capital etc.

Other main problems are:

- The basis risk associated with futures contacts,
- The need to take account of foreign exchange hedging in relation to overseas asset classes.

**(iv) The Trustees of Existing Scheme**

The trustees have a liability to pay a specified amount and as such they will want to meet that in the most efficient manner i.e. at the least expense to their scheme but without any other adverse affects.

If they pay in cash then any securities they sell will be priced on a bid basis i.e. based on the bid prices of the underlying investments.

If the transfer is settled in stock then the value of the stock transferred can be based on a more favourable basis, subject to the agreement of the relevant parties.

Typically, the basis would be to value the transferred stock on mid market prices. In this way, the managed fund avoids the transaction expenses of selling the stocks (although there may be some administrative expenses) and this saving can be passed onto the existing scheme in the unit prices it encashes units at. The saving achieved includes half the market turn and commission to the broker (if any).

The transaction expenses for a block trade have reduced substantially over the last decade but the existing scheme may achieve a saving of the order of ½% of the value transferred.

**The Trustees of Receiving Scheme**

The issues from the perspective of the trustees of the new scheme are similar i.e. if they receive cash they will incur transaction expenses on reinvesting which may be avoided if they accept stocks.

Further, they may suffer purchase price related tax that a stock transfer may avoid.

However, the stock received may not be what they wish to hold.

In this case, they will be worse off as they will incur not only the purchase transaction costs but also the sale transaction costs that would have fallen on the existing scheme if the payment had been in cash.

If cash is received then the scheme is effectively mismatched by term and type and they will not want to be out of the market for long. A stock transfer keeps them in the market.

- (v) In order to ensure that there is sufficient cash to pay benefits in future an asset/liability study will need to be performed.

This will allow account to be taken of the variation in the assets simultaneously with the variation in the liabilities.

Information will be needed on the assets and the liabilities so that a suitable cashflow model can be constructed.

The outcome of a particular investment strategy is examined with the model and compared with the investment objectives.

The investment strategy is adjusted in the light of the results obtained and the process repeated until the optimum strategy is reached.

Modelling can either be deterministic or stochastic.

If a deterministic model is used based on a set of specific assumptions about the future, scenario testing will also be performed.

If a stochastic model is used judgement will be required to establish the most appropriate form and appropriate value of the parameters.

The success of the strategy must be monitored by means of regular valuations. The valuation results will be compared with the projections from the modelling process and adjustments made to the strategy to control the level of actuarial risk if necessary.

Running yields on various asset classes will be investigated since an income deficiency is in prospect.

Since the fund is maturing there may be a requirement for closer matching irrespective of the income question.

The solution is likely to be to increase holdings of fixed interest investments and property. This could include higher yielding corporate bonds and some overseas bond markets, matching considerations permitting.

Property also has a high running yield, particularly slightly less than prime property, and this may be a better long term choice given recent poor returns and a prospect for some level of rental growth in future compared with purely fixed interest investments.

Some cash will also have to be held on an ongoing basis to meet the expected outgo.

Without knowing the extent of the shortfall and the precise asset distribution it is not possible to suggest what proportions need to be switched into higher yielding investments.

There are other possible long-term considerations including a bias within overseas portfolios to higher yielding markets.

## **END OF EXAMINERS' REPORT**