EXAMINATION

April 2006

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

The solutions given below cover the most important points for candidates but additional points can be made and appropriate marks were awarded for these. Alternative solutions are possible for certain parts of both questions (1(v) and (vi) in relation to asset allocation, 2 (ii) and (iii) in relation to alternative strategies provided they fitted the problem) and, provided that these were argued and documented in a similar fashion to the one given, marks were awarded.

In general candidates who failed did so because they did not cover points in sufficient detail or apply their knowledge. In 1(i) swaps appear to be known to only a few. Risk budgeting in (ii) was generally well explained but lacked detail about assumptions, timescales and tracking error. 1(iii) and (iv) were reasonably well answered although many candidates appear to have forgotten about correlation and its implications. In (v) candidates could work out the value of the liabilities but had more problems with the assets with few commenting that the deficit might have been removed. Candidates who failed mainly did not provide sufficient detail on the liability duration and so had no starting point from which to base their proposed asset allocation and the appropriate reasoning for it. This was also a feature of (vi).

In question 2 a high proportion of candidates appear to have interpreted "after allowing for" as including management expenses in the £3.5 million. This creates a different position for the charity — less income constrained — and so allows different answers to (ii). Marks were awarded in (ii) for reasoned argument where this assumption had been made in (i). There was evidence that poorer candidates were not using all the information given to them and many provided solutions that looked for a quick fix, including the unacceptable use of capital to supplement income, without thinking about the longer-term issues. There were some totally inappropriate short-term orientated strategies put forward. Parts (iii) and (iv) were reasonably answered with poorer candidates tending to be too bookwork orientated and failing to apply their knowledge to the portfolio in question. Part (v) showed a lack of knowledge about mortgage/property loan rates which resulted in many dismissing the proposal without fully analysing the issues. Part (vi) saw lots of knowledge being written down but little relating to how the products could be used by the charity.

1 (i) (a) Matching portfolio:

If there was no uncertainty about the sizes of the claim payments, nor their timing, then it would be possible to construct a cashflow profile for the insurer's liability outgo.

Given this, risk free fixed income and index-linked bonds and/or strips could be purchased so as to match the liabilities by duration exactly.

As virtually all of the payments will be made within 20 years, there are no issues in terms of finding bond issues of appropriate duration.

Although durations will be correctly matched, it is unlikely to be possible to exactly match cashflows as there will not always be bonds of the correct term.

Swaps can be used to further improve the profile of the asset proceeds and match the anticipated cashflows exactly.

Using swaps will have a transaction cost but this may be offset by the reduced future transaction costs as no/little rebalancing would be needed in the future.

Also using swaps may increase the yield on assets slightly as there is a "swap spread" which reflects a small amount of counterparty risk and illiquidity risk (once a swap has been transacted) relative to government bonds.

(b) Reasons:

In practice there is considerable liability uncertainty for a general insurance portfolio, and this limits the usefulness of this approach.

The insurer would not necessarily be able to exit the swap transaction on favourable terms if the liabilities were brought forward.

With bonds there is greater liquidity but the issue still applies.

A further disadvantage is that such an approach is based on risk free or swap yields, and in this scenario the assets have a less than 50% probability of being sufficient to cover the liabilities if they do not have a return above this level.

Therefore additional capital would be needed from the parent to support the business (it may already be needed to cover statutory solvency margins but ultimately this would be returned).

(ii) Definition:

Risk budgeting is a method of optimising investment efficiency (based on assumptions) with the aim of maximising return for a given level of investment risk.

In a risk budgeting framework, return and risk are generally measured relative to liabilities.

Risk budgeting involves asset and liability projections over a time horizon although different implementations will vary in the level of detail in their asset models and liability projection models.

Asset models will usually be stochastic in nature so that the distribution of outcomes (typically the 95th or 99th percentile return is extracted) is available as well as key statistics (e.g. mean, variance etc.).

Assumptions:

Risk budgeting requires assumptions about expected return, volatility and the correlations between the different asset classes available to the investor.

These assumptions should be appropriate for the projection period.

The framework can be extended to allow for expected return, volatility and correlation of an asset manager who is actively managing their position relative to a benchmark.

Care is needed in setting the assumptions as these will have a key impact on which asset classes and/or asset managers appear most attractive.

Setting the risk budget:

Before the risk budgeting process can be used to optimise the asset allocation a key initial decision is how much risk relative to liabilities ("tracking error") is desired.

The above question may itself be dependent on an investor's constraints e.g. required return to target assets equal to liabilities after *x* years, or VaR (loss at 95th percentile) below a certain size.

Therefore the risk budgeting process may initially be run using broad portfolios to attempt to assess the risk budget across the full range of asset allocations (from 0% in risky assets to 100% in risky assets) before optimising using the full opportunity set of asset classes in a narrower range.

Optimising the asset portfolio:

Once the risk budget (target tracking error) has been set, various portfolios are run through the risk budgeting model and their returns and tracking errors relative to liabilities are compared.

To speed up the iterative process of assessing asset classes, it is normal to look at marginal changes in risk and return for a small (e.g. 1%) increase in the allocation to each asset class.

After iterating through a range of portfolios and assessing which of the portfolios have most attractive return and risk characteristics the portfolios can be checked to see that they are acceptable from a qualitative perspective to the investor.

Those portfolios that are acceptable will (subject to the modelling assumptions) be close to optimal.

Miscellaneous:

If the composition of portfolios on the efficient frontier is required, then these can be obtained using mean-variance optimisation.

This approach does not yield the full range of statistics that a stochastic risk budgeting model would.

(iii) Overseas equities:

Overseas equities are helpful in terms of diversifying equity risk, particularly in view of the concentration risks of the UK equity market (the top 10 stocks make up half of the FTSE All Share Index by value).

However, investment in overseas equities exposes an investor with UK liabilities to currency risk.

Therefore this would not be an issue for UK investors with no constraints, although such investors are rare.

Currency risk:

Currency risk is potentially a useful diversifier of portfolio investment return as it has a low correlation to asset performance generally.

However it has an expected return of zero over long periods, and therefore if there is more than a modest amount of currency risk present in the portfolio then this is an unrewarded risk (relative to liabilities) and the risk taken should therefore reallocated to a form of risk which is rewarded.

At times there may be a small positive or negative return through hedging due to structural differences in short term cash rates between different currencies.

Hedging:

By hedging currency exposures, this unrewarded risk can be reduced or removed.

For an overseas equity portfolio, over 75% of the currency exposure would typically relate to the 3 major currencies (US dollar, Euro, Yen), and can therefore be easily hedged at low cost.

Therefore 75% is likely to be a pragmatic choice of hedge ratio.

The hedging could either be done based on actual exposures or on an approximate basis. If done exactly then the hedge will need to be reviewed periodically, potentially increasing transaction costs and overheads.

Other assets:

Of the other assets in the portfolio only the private equity and commodities will have currency risks attaching.

Assuming part of the private equity fund is invested in the UK a suitable hedge ratio might be in the region of 50–75%, hedging Euro exposures.

For commodities a suitable hedge ratio is less clear.

However prices for commodities are usually quoted in US dollars and a large proportion of most producers' costs will be dollar-linked and similarly the USA accounts for a large proportion of world demand. Therefore a hedge ratio of 50% to 100%, based on linkage to the dollar, could be justified.

(iv) Under an asset model there are three sets of parameters relating to each asset — mean, variance and correlation.

Correlation measures the degree to which returns for different asset classes are "linked".

This means that a diversified portfolio of weakly correlated assets will be more attractive from a portfolio perspective that a less well diversified portfolio or a portfolio comprised of more highly correlated assets, assuming similar mean and variance characteristics for the constituent assets.

Similarly, a linear combination of the risk-free asset and the asset with the highest mean/variance ratio is unlikely to be the most attractive portfolio for intermediate target mean or variance figures, as there is no diversification benefit which would reduce the portfolio variance for a given portfolio mean.

This is particularly the case when looking at the tails of a distribution, e.g. the VaR at the 95th or 99th percentile.

Another measure of the degree of attractiveness of a portfolio is to look at the 50th percentile (median) compared to the mean. Positively skewed portfolios are less attractive and more highly diversified portfolios will have a smaller difference between the two statistics (with the mean being higher for a typical asset distribution) than less well diversified portfolios.

This holds true except:

at the extremes of the distribution (ie if the target portfolio mean is set at too high a level only one or two assets will have a sufficiently high mean return to

be included in the portfolio, and similarly if the target portfolio variance is set at too low a level).

if there are one or two asset classes that a very attractive in terms of mean/variance ratio and/or correlations are high for all asset classes.

(v) Of the initial £520m liability, around £175m relates to each of short, medium and long tailed claims.

Based on a cost of £150m over a two year period it would appear that the original liability estimate was broadly reasonable…
…since one would expect the three year best estimate payout to be somewhat over £175m (depending on how many of the medium tailed liabilities have been paid; few of the longer tailed liabilities will have been paid).

A current liability figure might be:

$$525 \times 1.05^2 - 150 \times 1.05 = £421\text{m}$$

The asset value is likely to have increased by more than 5% p.a. over the two year period, based on its asset allocation. Therefore the assets and realistic liabilities may be approximately equal now (or the deficit will be much reduced).

It would be possible to allow for this by adopting a lower risk asset allocation and matching liabilities more closely, however this would then leave the insurer vulnerable to higher liabilities than expected if experience is poor.

If there is ultimately a surplus this will revert to shareholders and therefore there is likely to be some incentive to take some investment risks from a shareholder perspective.

After 2 years the liabilities will be approximately as follows:

Short:	$175 \times 1.05^2 - 140 \times 1.05 = £46\text{m}$	due within 1 year
Medium:	$175 \times 1.05^2 - 10 \times 1.05 = £182\text{m}$	due over next 5 years, midpoint 2.5 years say
Long:	$175 \times 1.05^2 = £193\text{m}$	due over next 18 years, midpoint 10 years

For a similar level of risk a suitable broad asset allocation might therefore be:

11% cash/money market instruments
43% bonds of term up to 10 years (including inflation-linked)
46% risky assets (equities, private equity, property, commodities)

Within the risky asset category it would not be appropriate to alter the allocation to private equity and property so these would remain approximately 8% each (allowing for growth and liability payments being met from cash and bonds).

UK equities, global equities and commodities would be allocated in proportion to their original allocations for the rest of the risky asset portfolio.

Corporate bonds and index-linked gilts would be allocated in a 3:2 proportion for the bond portfolio.

The asset allocation would therefore be:

UK equity	13%
Global ex-UK equity	13%
European (inc UK) private equity	8%
Property	8%
Commodities	4%
UK investment grade corporate bonds	26%
Index-linked gilts	17%
Cash and money market instruments	11%

(vi) (a) In 10 years time (12 years) virtually all of the short and medium tailed liabilities will have been paid out.

About half of the long tailed liabilities will have been paid out and the balance will be due over the next 8 years.

At this time it is likely that the private equity investment will have matured, unless it has been reinvested.

For liquidity reasons it will be appropriate to sell the property and commodity investments (at a suitable price) if they are still present in the holdings.

The diversification argument for holding property and commodities is less relevant as only 25% or less of assets are to be held in risky assets. Therefore a possible broad allocation might be (ignoring surplus):

12.5% (or possibly more) in cash
62.5% in bonds
25% (or less) in risky assets

(vi) (b) The asset allocation should therefore be:

UK equity	11%
Global ex-UK equity	11%
European (inc UK) private equity	Nil
Property	Nil
Commodities	Nil
UK investment grade corporate bonds (under 10 years)	38%
Index-linked gilts (under 10 years)	25%
Cash and money market instruments	15%

2 (i) The current income being generated is

[90 * 0.036 + 5 * 0.01 + 10 * 0.045 + 2 * 0.04] = £3.82 million.

Expenses are £100,000 + 107 * 0.002m = £314,000.

Therefore the fund just meets the trust's current expenditure.

Any loss of income is critical.

Looking at the portfolio, the yield on the UK equity portfolio has a high yield ratio (120%~).

Need to look at how sustainable this is and what growth might be seen.

Overseas equity yield is low and requires further investigation.

The gilt portfolio needs to be checked to see if the yield is being obtained at the expense of capital.

We need to review whether cash has been held historically or if this is just a snapshot at a point in time.

(ii) The problem that the fund has is that it is only just making its revenue requirement and the outlook is challenging.

Given inflation of say 2.5% and earnings growth of say 4–5%, the revenue needs to grow by 3.5–3.75% each year to maintain the expected expenditure.

Gilts and cash do not do that.

Therefore pressure on equity portfolios to achieve it as switching asset allocation to gilts would just put off the time when outgo will exceed income.

Next year we need to generate £3.95million (approx) which would require the UK equities to yield 3.75% at today's value.

We could do nothing and hope for a 4%+ rise in dividends.

Alternatively we could move the overseas equities to either UK equities or gilts.

Either way we would improve the position.

(iii) As the charity uses only the income from the fund, the illiquid nature of property is not an issue.

Further as an asset class it is a good diversification
property yields are both higher than equities and bonds
assuming all yields are shown net of higher annual management charges
and tend to rise at least in line with inflation.

The level of investment needs to take into account loss of income risk if voids were to occur.

An appropriate amount might be up to 25% of the fund but it would best be done in stages.

A strategy for selling existing investments to fund the purchases would need to be drawn up.

Assuming a property portfolio would yield about 6%, this would enhance the income stream and allow changes to the equity yield ratio to allow for possibly more long-term growth.

(iv) Well diversified, solid yields and fits the mandate.

Period to next reviews reasonably spread.

Office block has scope to enhance returns due to void.

Shopping Mall negotiations could be convoluted given number of tenants and timing of review could be an issue given consumer downturn.

Yield of 5.6% helps revenue account and gives portfolio time to be adjusted.

Additional information required is detail of each lease, nature of space available in office block, structure and nature of mall leasing, options that any tenants may have, financial strength of company leasing warehouse and nursery company, location of properties, rental incomes of similar properties in same locations, likely property development in each area.

(v) Cost of debt will be crucial to proposal.

Needs to be around 50bps lower to make it workable.

Will it be non-recourse lending?

Will it be property by property or for the portfolio as a whole?

If both options available, will interest rate be different?

What will covenants be?

If you can borrow at say 5.1%, yield becomes 6.35%, enhancing portfolio revenue.

Term of loans required to fit with reviews/ possible sale plans, loan conditions require to be studied.

Any reasoned argument should get marks but the best recommendation might be to mortgage the properties other than the mall with a slight reduction in yield. Loan against all properties rather than individual preferred.

(vi) Hedge funds come in many forms but in the main give a capital return rather than an income.

Thus not that useful in this context, although good risk diversifier and could grow capital to grow income.

Basically try to leverage return from difference in movement between two investments.

May be absolute in nature rather than relative performance orientated.
and have high fee levels.

Structured products use combinations of conventional investments and derivatives to produce "guaranteed or protected returns".

Come in many forms and can use both up and down performance to derive returns.

Normally provide both minimum and maximum returns linked to market movement but subject to floor and ceiling levels.

Structured products may be used to generate capital or income.

These might be useful to the fund especially if they could provide inflation linked return.

Cost effective as low management charges and can be tailored to purpose.

END OF EXAMINERS' REPORT