Faculty of Actuaries **Institute of Actuaries**

EXAMINATIONS

September 2000

Subject 301 — Investment and Asset Management

EXAMINERS' REPORT

Question 1

Question (i) was, in the main, answered well; part (ii) proved problematical with few candidates scoring well.

Question 2

Question 2 was one of the better answered questions on the paper with most candidates scoring well.

Question 3

Question 3 parts (i) and (ii) were answered well and most candidates made a reasonable attempt at part (iii), while most candidates made reference to the length of the pension fund's liabilities few referred to the fact that the liabilities were real, in addition fewer pointed out that pension funds can bear a higher level of risk.

Question 4

The answers to this question were very variable, a number of candidates made the assumption that the competitor funds would only invest in domestic equities while others seeing that the competitors were described as active automatically assumed that they would perform well.

Question 5

This question was answered well.

Question 6

Most candidates were able to score well on this question though a sizeable minority did not seem to know what a notional fund was.

Question 7

This question was poorly answered, those that treated the question as a capital projects question scored well on part (i) but often fell down on part (ii) as they just regurgitated the standard capital project answer without any attempt to adapt it to the project in question. Those candidates who did not treat the question as a capital projects question were still able to pick up some marks in part (i) but, in general, were unable to make much headway in part (ii).

Question 8

This question produced a varied response, some candidates were able to score very highly while others failed to score well. A number of candidates who didn't score well felt that 3% of the domestic equity market was insignificant; while others assumed that because the number of stocks was being reduced, the size of the fund was also being reduced. Others failed to grasp the significance of maintaining the sector weights. In addition some candidates were under the mistaken belief that funds with a mandate to track the index had to replicate the index within the portfolio.

Question 9

This question was answered well.

Question 10

In this question most candidates scored well in what was a book work question.

Question 11

While most candidates picked up a number of marks on this question there were a sizeable minority who did not score well. Many candidates seeing the word 'actuary' immediately assumed that the examiners were expecting that candidates should conclude that the actuary was the ideal candidate and hence were prepared to attribute every ideal characteristic to the actuary while dismissing the other two candidates.

Overall Comment

Overall the examiners were disappointed with the overall level of knowledge displayed by candidate. There were many opportunities to pick up easy marks by reproducing book work, however few candidates took full advantage of these opportunities. Where candidates were expected to think laterally or apply their knowledge the answers were, in the main, poor. The examiners would encourage careful thought about the special circumstances of some of the questions being asked since these are the areas where candidates can demonstrate their higher level skills.

There was a continuation of the disturbing trend noted in recent years of discussing "the liabilities" in circumstances where it did nothing to answer the question being asked. Also of concern was a minority of candidates who indiscriminately quoted the Actuarial Control Cycle, while the Actuarial Control Cycle is important it should only be quoted when relevant. The examiners are concerned that some candidates may hold the mistaken belief that mentioning these two points will automatically score them marks, when in fact it will only do so in relevant circumstances.

1 (i)

There are four main methods.

<u>Discounting the future income stream</u>

Consider the convertible bond as having two components:

- A fixed income stream until the date of conversion and
- A stream of dividends starting at the date of conversion

The date of conversion is then taken as the date for which this present value will be maximised

This is calculated as the first date at which the dividend income on conversion would exceed the initial fixed income from the bond

It is necessary to make the following assumptions when using the method:

- The rate of dividend growth on the underlying equity stock
- The investor's required rate of return

<u>Comparison with the share price</u>

A convertible can be valued by considering it as equivalent to the underlying share plus an extra amount of income for the period until conversion

Thus the value of the convertible is taken as the market price of the underlying share plus the discounted value of the income received in <u>excess of ordinary dividends</u> in the period before conversion.

<u>Comparison with loan stock or preference share price</u>

The minimum value of the convertible is the current value of the loan stock or preference share ignoring the option to convert.

<u>Option valuation method</u>

The three methods above assume conversion at a certain date or ignore the conversion option and so ignore the value of the option to convert

Using option pricing theory a convertible can be valued as a loan stock or preference share plus the value of the option to purchase the underlying shares.

The quoted market price of the convertible would also be considered if it were available

(ii)

The comparison with loan stock price or preference share price method gives a floor on the price and the manager would need to consider carefully if the price is less than this figure

The option valuation method gives an upper limit on price but this upper limit is heavily influenced by the share price volatility assumption used in the option valuation method.

The other two methods act as checks on the previous two methods ensuring that the results are reasonable.

2 Past performance is not a guide to the future.

There is a random element in investment returns.

It may be difficult to determine how much a fund manager's results are due to process and method and how much are due to luck.

Techniques that proved successful in one set of economic circumstances or market conditions may not work so well in other economic circumstances or market conditions in the future.

In the long term, higher risk portfolios are expected to produce higher returns.

Investment portfolio performance measurement needs to be adjusted for the level of risk before comparisons can be made between managers.

Investment portfolio performance measurement needs to be adjusted for differences in fund objectives and fund constraints before comparisons can be made between managers. In practice, this is very difficult to do.

Investment portfolio performance measurement needs to consider the differences between time-weighted and money-weighted rates of return to adjust for cash flows, etc.

Determining the frequency of performance measurement calculations requires a delicate balance between assessing performance frequently enough to spot problems early and correct them and avoiding spurious conclusions based on very short measurement periods.

Performance measurement impacts fund manager behaviour.

For example, a manager whose performance is measured against the median of her peers is unlikely to take asset allocation decisions that lead to her being significantly different to that of her peers.

This may not be in the best interests of the fund manager's client.

Users of performance measurement services must balance the value of the service against the cost.

For some assets, like property, valuation is difficult, expensive and in the end somewhat subjective.

Detailed and frequent valuations of such assets is inappropriate.

3 (i)

The key characteristics of money market instruments are:

- Highly liquid
- Stable capital values

(ii)

Pension funds might hold cash as a source of liquidity to meet outgoings, as a temporary holding strategy to avoid exposure to asset classes that are falling in value.

Some economic conditions might make cash temporarily attractive to pension funds.

Generally speaking rising interest rates will depress both bond and equity markets; a pension fund may wish to shorten the duration of its bond portfolio and move some money out of the equity markets and into cash.

At the start of a recession when equity markets might suffer from low growth and when bond yields may rise from an oversupply of government paper a pension fund manager may wish to put part of her portfolio in cash.

If the domestic currency is weak or expected to weaken further, a pension fund investment manager may place part of her portfolio in foreign money market instruments of a “safe haven” currency.

Cash may be held due to a contribution being paid which is awaiting investment.

Cash may be held as part of a derivative strategy.

(iii)

Historically cash has underperformed other asset classes over long periods of time.

Pension funds can bear the higher level of risk associated with equity investments in return for the higher levels of return where there is no need to realise assets in the short term.

Cash is not a good match for the nature of pension fund liabilities which tend to grow in line with salary inflation.

4 (i)

It will be difficult for the manager to know how the asset allocation of the "median manager" or the median return between the dates the information is published – which could be up to a month after a quarter end.

This makes it very difficult for the manager to assess the level of risk she is taking relative to the benchmark.

The size of the manager's fund may be small compared with his competitors making it difficult to get cost effective exposures to some international equity markets.

The mandate constraint – no domestic equities – may be a particularly difficult one in times when the local market is performing very well and the manager's competitors are heavily exposed to the local market as part of their "international equities" portfolio.

- Overseas investment expertise may be expensive in a small European country.
- For a relatively small fund, the costs of custody and settlement may be very high relative to the returns generated.
- The manager will have to deal with the different accounting conventions, language problems and time zones.
- There are considerable fixed overheads in managing a portfolio of international equities which may detract from the return or reduce the manager's margin.
- Currency risk

(ii)

Grow the size of funds under management to make it move economically viable to operate an international equity portfolio – this could done by acquisition or organically and to include domestic equities.

- Get the benchmark changed to say the relevant FT/S&P World Index excluding the country in question.

- Get the asset allocation and performance data produced more frequently – like monthly.

- Use index derivatives to cut the cost and increase the speed of asset allocation.

- Act as an asset allocator across countries and contract out the investment management to an index manager to track the chosen indices.

5 The Dow Jones Industrial Average is made up of 30 shares.
It is unrepresentative of the US market.
It is an unweighted arithmetic average index.
Movements in the index are a quick guide to daily movements in the prices of shares mainly in the industrial sector.

S&P 500 index (also called the S&P Composite index) is made up of 500 shares.
It is a weighted arithmetic average index.
Its constituents are a broad cross-section of all the sectors in the US market.
It is suitable for the performance measurement of a fund's portfolio of US equities.

Nikkei Dow Industrial Average 225 (commonly know as the Nikkei 225) consists of 225 shares.
It is an unweighted arithmetic index.
It is not representative of the Japanese market as it had changed little since its inception. (Note: actually, this index has been revised quite considerably to bring its structure more into line with the broad market, but the Core Reading does not yet reflect this).
It is nonetheless a widely used indicator of short term movements in the Japanese equity market.

Topix (Tokyo Stock Exchange First Selection Index) comprises approximately 1,100 shares.
It is a weighted arithmetic index.
Constituents represent the leading companies in the market.
The index is suitable for use in performance measurement.

MSCI should be allowed as an index (market cap weighted arithmetic, wide sector and stock coverage, multi-currency versions, not readily available but good for performance measurement).

FT/S&P Actuaries World Index (Japan) should get credit and the key points are

- Arithmetic weighted average;
- Quoted indifferent major currencies as well as yen;
- Stocks not available to foreign investors excluded;
- Good/suitable for performance measurement

Nikkei 300 should be treated in the same way as Nikkei 225 but comment should be made that it is a broader and more representative index of the domestic market.

6 A notional portfolio is a tool to help smooth the results of actuarial valuations of pension fund assets over time and thus avoid the volatility associated with a market value approach to asset valuation.

Notional portfolios tend to be made up of assets that reflect the broad characteristics of the liability profile.

It tends to be influenced by the actuary's desire not to change elements of the actuarial basis unnecessarily.

It is a discounted income approach to the valuation of assets where the assumptions used in valuing the assets are consistent with those used in valuing the liabilities.

The approach produces a different ratio of the market value of each asset to its calculated value in actuarial valuations.

The result of the valuation will be influenced by the assets held by the investment manager on the valuation date.

However, the actual distribution of the fund's assets at the valuation date represents the investment manager's views of short and long term prospects for each asset class. The investments are replaced as a result of changes in that view.

If the actuary replaces the actual assets with a notional portfolio, there is no risk that the valuation process stands between the investment manager and the best investment policy for the fund.

Using a notional portfolio also removes the problem of having to estimate cash flows on each individual asset and reduces the amount of calculation required.

The bookwork should be properly explained.

7 (i)

What criteria have been established by the directors for assessing the viability of projects under the following headings:

- Financial results expected (internal rate of return, net present value or payback period)
- The consequences for the company if these results are not achieved
- Achieving synergy with other projects undertaken by the company
- Satisfying political and regulatory constraints within and outside the company
- Use of scarce capital and/or management resources in the best way possible
- The extent of the upside potential in the project?

(ii)

The capital investment of £25 million can only be repaid as new money is raised from investors as £25m is the minimum fund size for such a portfolio.

The only source of income appears to be the fund management charge.

However, this will grow in line with inflows of new money to the fund and the increase in the value of the fund due to investment performance.

The expenses consist of the costs of running, selling and marketing the fund.

Some discussion of the ability of the existing distribution channels of the company would be required in order to assess their ability to sell passive/index fund management.

There does not seem to be much scope for significant upside in the project given the 0.2% p.a. management charge. However, the fund may be needed to hold funds which are moving a core to passive mangers and retaining a satellite fund with active managers.

As an alternative answer: The key issues in realising the upside from the project are economies of scale and persistency of the business. Overheads are more fixed in nature and hence the business would become very profitable beyond a certain minimum fund size. Persistency is also important in recouping acquisition costs.

The risks in the project and the possible risk mitigation strategies.

The political issue of moving from active management to passive management and its impact on the moral of individual fund managers.

Detailed analysis tends to be expensive. So more complex evaluations will be left until it is clear that the effort is justified.

Draw the attention of the directors to the fact that there may be alternative projects which make better use of the scarce resources available.

The directors attention should be drawn to the sensitivity of the results to varying assumptions as to new cash inflows, investment returns, lapses and sales, operational and marketing expenses.

8

Although there is no change to the sector weights, this is a very large change to the portfolio, turning over a large proportion of the stocks.

Given the 3% of market cap size, this is also likely to involve substantial turnover in terms of the domestic market.

The main problems will be:

- Moving prices against the fund – the size of the portfolio means stocks being sold are likely to fall in value, stocks being bought are likely to rise.

- Judging the short term success of the switch will be difficult – the fund's own demand will push up the price of the stocks retained.

- Considerable time will be taken to effect the change if prices are not to be moved too much against the fund.

- There are difficulties in ensuring that timing of deals is advantageous.

- Dealing costs will reduce the return on the fund after taking account of expenses.

- There is a possibility of crystallising capital gains which may be subject to tax.

- There may be some infringement of asset percentage restrictions.

- The diversification of the portfolio will reduce and so the risk will increase.

- This places more weight on stock selection, and so on research and analysis (although this is not necessarily a disadvantage, given the active nature of the manager).

Some answers may cover "compliance" issues. The following may also be considered:

- What do product rules say, allow and what are product holders' expectations?

- What implications are there for staff requirements to manage it?

- Are the fund management charges going to charge to cover the extra cost of active management?

- How will the performance record and measurement be dealt with?

9 (i)

Factories are cheap and easy to build. So an under-supply in the market can be quickly corrected. Thus the potential for upside growth is limited.

Factories tend to become obsolete more quickly thus requiring a higher level of refurbishment expenditure compared with offices and shops.

Compared with shops and offices, the site value of factories tends to be significantly lower. So deterioration of the building leads to depreciation costs that are a high proportion of total value.

Manufacturing industry is particularly vulnerable to economic recession and bankruptcy of a tenant will result in a rent void. This applies particularly where the building is unsuitable for any other use.

The fabric of factories is more vulnerable to deterioration compared with shops and offices.

(ii)

The quality of the tenant's covenant, the price and the rental income of the property.
The state of repair of the factory.
The ability to relet the property to another manufacturer or convert it to some other use in the event of a void.
The general economic outlook for the economy including, inflation, interest rates and the exchange rate.
The outlook for the sector of the economy in which the factory operates.
Location of factory in term of access to transport and a steady supply of suitably skilled labour.
The existing property holdings of the pension fund; will the factory add to the concentration by geographical area or property type or will it improve the diversification of the fund.
The potential for rezoning or development of the factory site.
The size of the deal.
Nature of lease and tenant's responsibilities.

10 (i)

Credit risk is the risk that a counterparty to the swap transaction will default on its obligations to exchange cashflows.

For a credit loss to occur the counterparty must default when the swap has a positive value to the non-defaulting counterparty.

Market risk is the risk that the value of a swap may shift from being an asset in the books of the counterparty to being a liability of the counterparty due to changes in interest rates.

(ii)

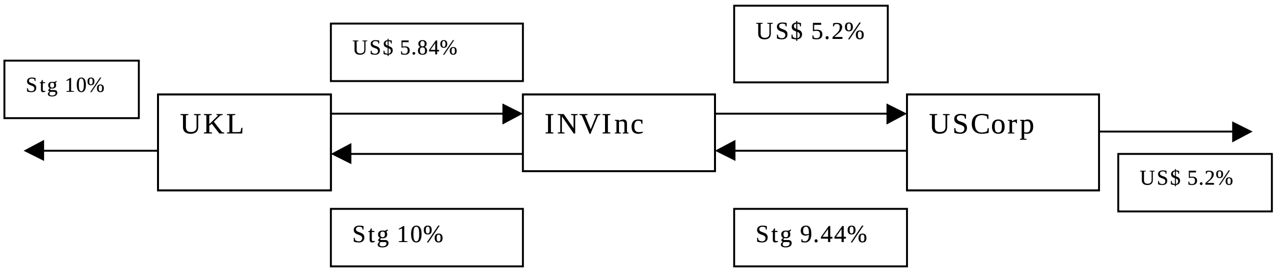
Interest rates will change over the life of the swap so that to the bank one of the offsetting swaps is an asset and the other one is a liability.

If bank's counterparty to the swap which is an asset in the bank's books defaults, the bank must still honour its commitments to the counterparty to the swap which is a liability in the bank's books.

The banks still has a credit risk even though its market risk has been offset because it has separate contracts with each counterparty.

It is important that the candidate differentiates properly between credit risk and market risk.

(iii)



The total benefit that can be split between the parties is 40 basis points. If UKL and USCorp get a benefit of 16 basis points each, INVInc should get the remaining 8 basis points.

swap diagram split as follows: for getting the correct apparent gain to UKL and USCorp and ensure that UKL and USCorp don't have any foreign exchange rate risk

Risks faced by INVInc:

- INVInc faces credit risk if either counterparty default when the swap has a positive value to INVInc

- INVInc faces foreign exchange risk; it earns 64 basis points in US$ and pays 54 basis points in sterling – this is in effect market risk.

11 Self-regulation is a system organised and operated by the participants in a particular market. There is little or no government intervention in the market.

In statutory regulation, the government sets the rules and polices them.

The lawyer

Likely to be skilful in drafting government legislation – i.e. framework will be legally tight
Will be close to government sources and able to understand government agenda
Likely to be aware of known abuses (e.g. possible reasons for introduction)
Should understand capabilities of local practitioners and consumers
Independent - not aligned to market
Will be viewed as consumer friendly
Close to aligned statutory bodies, e.g. competition authorities
Likely to be able to tap into similar international regulatory networks
May lack the knowledge of the detailed workings of financial markets
Under market practitioner
May lack consumers' confidence due to "closeness to industry".

The market practitioner

Likely to have good knowledge of other countries systems
Will have practical awareness of likely risks and potentially bad practice, e.g. cartels, insider activity, etc.
Likely to be seen as reasonably "friendly" to industry needs
Likely to be persuasive to companies on need for change since "close" to them
Good awareness of quick win benefits, i.e. greatest inherent dangers
Likely to understand cost / benefit trade-off from companies' perspective
Will have "rapid response" attitude to market practitioner needs
Seen as independent from government

The actuary

Should have reasonable insight into market practice, wider international knowledge
Not aligned to business, so can be seen as consumer friendly
But also seen as independent from consumer by business
But appreciative of cost / benefit trade-off
Should be technically up to speed with innovation and its risks for regulation
Can liase with international professional network
Should adopt practical but strict guideline approach, e.g. freedom with publication
Statistical gatherer to make cartels less likely.