INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

April 2012 examinations

Subject SA6 – Investment Special Applications

Purpose of Examiners' Reports

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 who are 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. Although Examiners have access to the Core Reading, which is designed to interpret the syllabus, the Examiners are not required to examine the content of Core Reading. Notwithstanding that, the questions set, and the following comments, will generally be based on Core Reading.

For numerical questions the Examiners' preferred approach to the solution is reproduced in this report. Other valid approaches are always given appropriate credit; where there is a commonly used alternative approach, this is also noted in the report. For essay-style questions, and particularly the open-ended questions in the later subjects, this report contains all the points for which the Examiners awarded marks. This is much more than a model solution – it would be impossible to write down all the points in the report in the time allowed for the question.

T J Birse
Chairman of the Board of Examiners

July 2012

General comments

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 recently qualified actuary or 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 parts of questions.

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.

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. 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 increasing short term focus and political/regulatory backdrop has become increasing challenging for investors. A clear trend has been the move towards solutions that balance risk and reward appropriately given the sophistication of the investor. Investors have also focussed on different legal structures to gain exposure to asset classes which will blur the traditional equity/debt allocation divide. Given an overall appraisal framework of "quality, security, profitability and liquidity", candidates need to be able to explore the trade off each opportunity represents and any new types of risk (such as operations, liquidity, credit, model and counterparty) incurred that justify new ways of regulation, monitoring (and against what benchmark) and management.

As actuaries move into wider fields, the examiners are likely to focus on the practical application of core skills in what may appear unfamiliar situations. However, better candidates should be able to identify the key principles and considerations that a solution demands, since this should be a regular feature of their "day job".

The examiners share and agree alternative possible solutions to questions during the marking process

Specific comments on April 2012 paper

A very poorly answered paper compared with previous diets, although a slight improvement on the last exam reflected in the number of FB grades (as opposed to FCs). The pass mark was lowered slightly from the previous diet and the average mark remains much lower than the examiners feel ought to achievable by candidates, who are likely to be working as advisers or asset managers in this most practical of fields. Whereas previous papers had looked to examine capital market or government policy detail, much of this paper reflected the live case study being played out in the Eurozone and hence ought to have been more familiar territory than the marks scored would suggest.

Candidates typically answered Question 1 better than the other two (albeit foregoing more than half of the marks available) with Question 2 attracting the worst response with average scores of around a quarter of the 26 available marks.

Those candidates 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. .

1 (i) One mark awarded for each sensible comment along with an appropriate reason.

Comments should be based the typical problems of Overseas Investment – although each comment should be made appropriate to the question.

Comments regarding implementation issues should also be covered (e.g. illiquid markets, buying or selling relatively large quantities)

Other sensible points are also acceptable.

(ii) (a) The Pensionma is likely to depreciate significantly vis-à-vis the currency of the original currency union and vis-à-vis the new currencies of the other former members of the currency union due to its poor economic performance.

The economic shock to Pensionia of re-establishing its own currency is likely to be significant, resulting in considerable economic uncertainty.

Due to its poor economic performance, and the likely low level of confidence in its new currency, there may effectively be a dual currency system in Pensionia, with the currencies of larger and stronger former members of the currency union also being used (similar to the way the Dollar is used in some developing countries).

Domestic Equity Market

The weak economic performance is likely to result in a poor <u>real</u> performance of the domestic equity market.

Bond yields are likely to be high (more below) and should lead to high interest rates which should hinder economic activity, reduce corporate profitability and future dividends, and thus hurt equity prices.

However, the size of the effective depreciation of the new currency could mean that the nominal performance of the domestic equity market may be positive.

The depreciation of the currency is likely to result in significant imported inflation, resulting in higher prices (more below). Import substitution is likely to aid the performance of domestic companies that are quoted on the domestic equity market.

The depreciation of the currency will make domestic exporting companies more competitive, which could lead to them gaining more market share and higher profit margins. This will likely boost their share prices.

Any form of protectionism implemented by the Pensionia government during the crisis is likely to boost profits of domestic companies in the

short term, but it may harm their competitiveness longer term. This could add to positive equity returns in the short term, albeit possibly hurt longer term performance.

In foreign currency terms, any rise in the domestic equity market is likely to be cancelled out by the depreciation of the currency and reflect the poor real performance.

Companies that operate mainly in the domestic market will be worse affected and those that mainly export least affected (or positively affected).

Equities are a real asset and may also move higher on the prospect of higher inflation, or the removal of deflationary expectations.

If investors get worried about increasing inflationary expectations this would cause a stock market sell-off if it was felt it would lead to deflationary economic policies to counteract it.

Domestic demand is likely to be weak due to poor economic performance resulting in high unemployment and high interest rates, leading to lower disposable incomes. Consumer confidence is likely to be low due to the poor and uncertain economic situation.

Inwards investment into Pensionia will be hurt by the economic uncertainty but may also be aided by the more competitive exchange rate of the country. The consequent impacts on economic performance will feed through into the stock market.

Other sensible comments also accepted

Domestic Bond Market

Confidence in the new currency is likely to be low, resulting in higher bond yields to compensate investors.

The default risk from bonds in Pensionia is likely to be significant also, resulting in a higher default premium in the bond yields.

The risk of future depreciation of the currency is also likely to result in investors demanding higher bond yields.

In the extreme case where Pensionia cannot access the bond markets, it would need to borrow from the International Monetary Fund. This would likely come with harsh austere economic policies which could aid the country in the longer term but which could also hurt its economic performance in the short run, adding to the uncertainty, default and currency depreciation risk.

Higher yields mean lower bond prices and negative returns.

To the extent to which this is already priced into the bond market, positive economic developments are likely to result in lower bond yields and higher bond prices, and negative economic developments the opposite

Bonds denominated in the currency of the old currency area are likely to face legal issues regarding in which currency they will be redeemed. However, these bonds might be likely to see lower yields and higher prices than bonds denominated in the new currency.

However, if there are higher inflationary expectations, it may increase yields at the longer end of the yield curve.

Central bank interest rate changes and credit downgrades may result from the economic situation having a knock-on effect in the bond market.

(b) **Inflation**

Lower exchange rates will increase the cost of imported goods and services leading to supply side inflation. The impact on the inflation rate will depend on whether these higher costs can be passed on to consumers. Given the likely scale of the depreciation of the currency, it will be difficult for companies not to pass on these higher prices. Weak demand and the pressure of domestic alternatives are a limiting influence.

The use of forward currency contracts will create a longer lag.

Higher interest rates may mean a decreased quantity of money is demanded which is met by a decrease in the money supply. This can lead to lower inflation (demand side). Demand side inflation typically has a longer lag than economic growth.

Imported products are likely to see the largest price increases. Domestically produced good are also likely to see price rises to the extent that the prices of the inputs to their production increase.

Earnings Inflation

There is likely to be some earnings inflation, especially for wages and salaries tied to the inflation rate.

This will be offset by poor economic performance likely leading to higher unemployment resulting in downward pressure on wages.

Overall earnings inflation is likely to be less than price inflation, resulting in lower real earnings – assuming some free market forces are at work

Wages in exporting firms are likely to rise most and wages for those working in the non-traded goods sectors are likely to be see the lowest.

Demand driven inflation likely to be lower over time as resulting economic uncertainty will likely feed through to lower demand / higher savings rate in the population.

This may also affect earnings inflation over time with less wage increase demands.

Other sensible answers are also acceptable.

(iii) 1 mark for each sensible reasoned statement regarding a factor to consider. Answer to be in the form of an answer to an "explain" type question…

The following factors are amongst those relevant….

General factors relevant to investing in Government Bonds, along with explanation.

Matching considerations – discussion of link between income tax revenue growth and the liabilities of a domestic pension scheme – earnings inflation linked bonds?? – discuss.

Discussion regarding the liabilities of the pension scheme

The definition of income tax receipts – any restrictions on the government. Other legal issues. Credibility of any restrictions. Risk of a future switch towards non-income tax revenue generation.

The expected return. Comparison with any indexed linked government bonds currently available to assess attractiveness of the expected return.

Size of the issue – marketability, liquidity, cost of dealing. How big is the pension fund?

Future issuing intentions – one off or regular issuing.

Future availability of derivatives based on the bond.

Credit rating of the government involved. More information requested about the major economic crisis.

Diversifying risk – if government considered a default risk may want to spread risk abroad.

The existing asset allocation of the pension scheme.

The duration of the bond.

The tax treatment of the bond. Possible future changes. Tax treatment for pension schemes versus others.

(iv) The needs of the government.

Funding

The government may be having problems with either high bond yields or limited access to capital markets.

Such a bond may be attractive to investors with real liabilities – improving the governments funding capability and increasing demand for its securities, which may lower funding costs.

Due to the nature of the bond it is not in the government's interest to "print money" as the resulting inflation will also increase tax revenues and increase the nominal value of the debt bonds outstanding. This may be considered a good thing as it will discipline fiscal policy. But in extreme cases the government may need to print money to solve their problems and this bond would hinder that.

Politics

This bond may cause voter disquiet as the government is effectively nearly directly selling off future tax revenues. This is transferring wealth from future generations and the young to the current generation and the older elements of society.

Bond Market

The government may be seen as innovative and strong in issuing such a bond which could improve the bond markets view of the attractiveness of the country's bonds in general.

2 (i) A structured product is a pre-packaged investment strategy in the form of a single investment.

A typical structured product will consist of two components:

- a Note – essentially a zero-coupon debt security that provides capital protection, i.e. guarantees a return of all or part of the initial investment at maturity
- a derivative component that provides exposure to one or several underlying assets such as equities, commodities, FX or interest rates

Returns from the derivative can be paid out in the form of coupons during the lifetime of the product, or added to proceeds at maturity.

(ii) The creation of a structured product will involve a number of different desks within a bank, all of which will receive some economic benefit.

Funding: most structured products provide term funding for the life of the product for the bank. This funding is stable and predictable (subject to terminations) and can often be sourced at a lower cost than that in the wholesale markets. Additionally, the funding received is often from a different investor source so this provides useful diversification of a bank's funding sources (but not always, for example if deposits are used to purchase products).

Trading/derivatives: structured products provide a customised payoff to the investor, by exchanging the floating rate payable on term funding into a payoff linked to equities, commodities, FX or interest rates. In the simplest structures, a "delta one" payoff is provided. More complex structures make use of embedded options to provide nonlinear exposures to markets, with caps and floors. Several derivatives and trading desks may be involved, creating significant scope for the desks to generate revenues and profits through trading activity and dealing spreads borne by the structured product.

Investor sales/distribution: additionally, various teams within a bank's sales force or branch network may be involved in selling the products, generating sales commissions.

(iii) Payoff – the structured product provides the investor with the return on the S&P500 price index for a cost which may have implicit "fees", whereas the ETF provides the investor with the return on the S&P500 total return index less fees and expenses.

Funding – the ETF will be collateralised with some assets, therefore it will not provide much (if any) funding for the bank as the structured product. The structured product will provide stable funding for 3 years, probably at a lower cost than the bank's short term cost of funding.

Management fees and expenses – the ETF will charge an explicit management fee and other direct expenses, whereas these are embedded in the payoff for the structured product.

Distribution fees – the investor in the ETF may incur dealing or brokerage costs when buying units in the ETF, whereas these will be embedded with the payoff for the structured product.

Collateralisation/security – the ETF will be backed by collateral such that the net asset value of a unit broadly corresponds to its quoted value, and is held in a ring-fenced investor account. Conversely the structured product is an unsecured deposit that is a liability of the bank.

Open/closed – the ETF will be structured as an open vehicle with units being created or cancelled on a daily basis. The structured product will be a closed vehicle that is created at a single date at the end of a subscription period.

Open ended / fixed term – the ETF has no set maturity date whereas the structured product will have a predefined end date.

Open/closed – the ETF will be structured as an open vehicle with units being created or cancelled on a daily basis. The structured product will be a closed vehicle that is created at a single date at the end of a subscription period, and will end 3 years after this.

Liquidity – the ETF will provide daily liquidity, whereas the structured product may not have the ability to be terminated prior to its maturity date.

Issue size – the ETF is likely to be much larger in size than the amounts invested in a series of structured products of this type.

Distribution method – units in the ETF will be listed on an exchange (daily dealing) and may be purchased from a range of brokers or the bank directly, whereas a structured product will generally be unlisted and be available from financial advisers and the bank's retail sales force.

(iv) Valid criticisms can be made about collateral quality and haircuts which are key to ensuring investor security in the event of the bank's default. Subject to satisfactory terms being offered to protect investors' interests, synthetic ETFs can have the following advantages over physical ETFs:

- Low/nil tracking error relative to target return.
- Lower investment fees due to income received through provision of funding to bank.
- Collateral can be more liquid than the underlying assets in event of bank failure.
- Stock can be lent out in a physical ETF, no corresponding risks with a synthetic ETF.
- Ability to access asset classes that are not directly investible through a replication approach (e.g. illiquid or non-traded assets where daily liquidity is not achievable).
- Ability to introduce exotic asset exposures that are not amenable to a replication approach (e.g. options, "best of" returns, variable leverage etc)

3 (i) **Granularity**

- The risk model will need to be sufficiently granular to capture all material risk factors arising from the insurance company's investment portfolio.
- Coverage of all asset classes within current assets and likely future assets.
- Additionally, the risk model is likely to be used to measure investment risks arising from the insurer's liabilities.

Realism

- The model will need to provide a realistic representation of extreme downside outcomes from the dominant asset classes (often equities and bonds).
- The model will need to realistically model the dependencies between the dominant asset classes, including any tail dependency.

Practical factors

- The model needs to be able to be run within a few hours, which entails compromises between model complexity and available data, and is subject to limitations on computing power.
- The model needs to have reliable data feeds from the investment management systems and other data sources to ensure that it can be run with minimal data preparation and manual intervention.

(ii) There are a number of differences in approach, which may make it appropriate to have two models tailored to each need rather than attempt to build a single model that caters less well for both needs:

- The strategic asset allocation will only be reviewed infrequently, rather than daily, so it is possible for a process that has significant run-time or requires manual intervention to be followed.
- The SAA analysis will need to consider multiple portfolios, and may involve some form of optimisation, rather than considering a single portfolio only.
- The SAA analysis is likely to consider multiple points on the return distribution and expected returns, rather than just the losses that could occur under the stressed scenarios.
- Sensitivity analysis of assumptions may be carried out.
- The SAA model may include a more complex dependency structure to capture the different levels of dependency / diversification at different points on the return distribution.

END OF EXAMINERS' REPORT