

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

September 2017

Subject SA6 – Investment Specialist Applications

Introduction

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 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. The Examiners have access to the Core Reading, which is designed to interpret the syllabus, and will generally base questions around it but are not required to examine the content of Core Reading specifically or exclusively.

For numerical questions the Examiners' preferred approach to the solution is reproduced in this report; other valid approaches are given appropriate credit. For essay-style questions, particularly the open-ended questions in the later subjects, the report may contain more points than the Examiners will expect from a solution that scores full marks.

The report is written based on the legislative and regulatory context pertaining to the date that the examination was set. Candidates should take into account the possibility that circumstances may have changed if using these reports for revision.

Luke Hatter
Chair of the Board of Examiners
December 2017

A. General comments on the *aims of this subject and how it is marked*

1. The aim of the Investment Specialist Applications subject is to instil in successful candidates the ability to apply knowledge of the United Kingdom investment environment and the principles of actuarial practice to the selection and management of investments appropriate to the needs of investors.
2. Candidates are reminded to ensure that their answers are sufficiently detailed to demonstrate understanding, as there were instances where inadequate explanations led to candidates scoring less well on questions than they might have done. The model solutions are intended to reflect the level of detail that a high scoring candidate might be able to produce. For many questions there are more marks available than the question requires to achieve full marks. This reflects that the examiners will give credit for valid alternative solutions, particularly in questions focussed on higher level skills.
3. Candidates who give well-reasoned points, not in the marking schedule, are awarded marks for doing so.

B. General comments on *student performance in this diet of the examination*

This paper was well answered. Candidates in general demonstrated a good grasp of Core Reading and were able to apply this knowledge in familiar situations. Candidates overall scored less well in parts of questions where higher order skills were being assessed or where the underlying scenario was less familiar to them.

C. Pass Mark

The Pass Mark for this exam was 60%.

Solutions

- Q1** (i) Quantitative Easing (QE) is a monetary policy used by some central banks to increase the supply of money. [1]

It usually involves both a direct increase in the money supply and a knock-on effect from the fractional reserve system, [½]
increasing the money supply further. [½]

Although it can involve just making changes to the fractional reserve system, which increases the money supply. [½]

QE is usually implemented by a central bank by first crediting its own account with money it creates ex nihilo (“out of nothing”) [1]

It then purchases financial assets, for example government bonds, agency debt, mortgage-backed securities and corporate bonds, from banks and other financial institutions in a process referred to as open market operations. [1]

It can also involve changing the reserve requirements that through the fractional reserve system would increase the money supply. [1]

Other reasonable comments would also be given credit.

[Max 5]

- (ii) The US Federal Reserve (Fed), the European Central Bank (ECB) and the Bank of England (BOE) have in recent years broadened their asset purchases to include corporate bonds and other non-government bonds. [1]
This has led to reduced borrowing costs for corporate issuers by lowering credit spreads. [1]

The Bank of Japan (BOJ) has broadened their QE policy to buy Exchange Traded Funds (ETFs). [1]

Typically these ETFs have been equity funds, so the QE policy leads directly to greater demand and higher prices for equities. [1]

The Bank of England also launched the Funding for Lending Scheme (FLS) which provided low-cost funding to banks. [1]

The cost of the funding was linked to the banks' lending performance to the "real economy". [1]

Other reasonable comments would also be given credit.

[Max 3]

(iii) **Impact on Bond Market**

QE will likely directly impact the bond market due to the purchasing of bonds by the central bank – driving up prices and driving down yields. [1]

Speculation by market participants is likely to exacerbate this impact as speculators try to front-run the central bank. [1]

Those who sell government bonds to the central bank will likely want to purchase other bonds in their place. [1]

Central banks, such as the ECB and BOJ have begun to also directly purchase non-government bonds, meaning that there will also be a direct impact on those markets. [1]

Secondary impacts

The secondary impact will be that more corporate bonds are issued to take advantage of the lower yields and lower financing costs. [1]

This may moderate the increase in prices and decrease in yields in the bond markets. [1]

In the longer-term the additional issuance could lead to higher inflation due to increased economic activity. [1]

Impact on equity markets

Those who sell their assets to the central banks, e.g. their bonds or corporate bonds, will receive cash. [1]

Due to low yields they will typically want to invest the cash in equities and other higher yielding assets. [1]

This is likely to result in rising prices for equities and other risky assets. [1]

Secondary impacts

Companies are likely to use the lower bond yields to issue more bonds for share buybacks. [1]

Companies may also refinance existing debt at lower yields. [1]

This is likely to lead to increased growth prospects and increased corporate profitability due to lower financing costs. [1]

Other reasonable comments would also be given credit.

[Max 10]

- (iv) Two approaches to answering this question have been set out below:

Approach 1 (Quantity Theory of Money)

The Quantity Theory of Money states that $MV = PQ$ [1]

where M is the money supply, V is the velocity of money (usually assumed constant in the simple model), P = price levels and Q is overall output. [1]

QE results in a bigger M – this needs to be balanced by a bigger P or bigger Q. [1]

QE has not resulted in any significant economic growth so the Q increase has been quite limited. [1]

So the balancing effect needs to mostly come from bigger P. [1]

An asset bubble would be created when most of the bigger P has come from higher asset prices rather than higher goods prices. [1]

Approach 2 (supply-demand arguments)

QE is likely to distort prices artificially by the significant asset purchases and knock-on impacts. [1]

QE is likely to push asset prices away from their fair values. Lower bond yields are also likely to push the discount rate used in equity valuation below their long-term fair values further distorting prices. [1½]

Whether it leads to an asset bubble depends on the size and the duration of the distortion to prices created by QE. [1]

The greater the size of the QE asset purchases, and the longer their duration, the greater the risk of a bubble arising. [½]

Other reasonable comments would also be given credit.

[Max 4]

- (v) *There is no one solution to this question. A variety of reasoned answers, with an appropriate tone, would be given credit.*

If an asset bubble arises, it might burst due to:

- An ending of the QE asset purchasing, removing the artificial distortion to the asset prices. [1]
- Prices getting so far above their fair-values that the weight of market selling becomes bigger than the weight of purchases created by QE. [1]
- The QE narrative might evolve creating greater real understanding of its impacts resulting in a greater degree of selling of the over-priced assets. [1]
- A significant event, e.g. a Lehman Brothers style event, might trigger a loss of confidence in central banks. [1]
- Increased inflation from QE may result in an interest rate or currency response. [1]

Other reasonable comments will also be given credit

[Max 3]

[Total 25]

Question 1 was the best answered question on the paper. Parts (i) and (iv) were the best answered parts whereas the other parts were less well answered, despite similar questions being set in recent years.

- Q2** (i) Relevant factors will include:

Levies / liabilities

The ability of the Fund to increase future levy payments. The greater the scope is, the more investment risk could be taken. [1]

The ability of current power stations to bear higher levy payments. The greater the scope is, the more investment risk could be taken. [1]

How conservative are the assumptions used for determining the long-term liabilities. More conservative assumptions would permit greater scope for taking investment risk since future contributions will be higher. [1]

Solvency

The higher the Fund's solvency, the more scope there is to take investment risk. [1]

Potentially the Fund may also be able to raise debt against its future levy payments, which would also increase its ability to invest in higher yielding assets. [1]

Time horizon

As the average duration of the Fund's liabilities reduces, its scope to take investment risk will reduce. [1]

This will happen as it approaches "steady state" or if no new nuclear powers stations are built. [1]

Risk appetite / governance

The level of appetite for investment risk within the Board will also be a factor. [1]

Potentially this may be constrained by government, regulators or its constitution. [1, at least one constraint needed]
[Max 6, 1 mark per point - Need both the factor and the impact]

- (ii) The first step is to analyse the liabilities and determine the profile of interest rate and inflation exposure at different maturities. [1]
Having carried out this analysis, a portfolio of matching interest rate and inflation swaps can be constructed. [1]
Under an interest rate swap one party pays a floating rate and the other party pays a fixed rate. [1]
The fixed rates have similar sensitivity characteristics to fixed interest bonds. [1]
Therefore the receiver of fixed rates will be able to hedge the duration of a stream of liability cashflows. [1]
Under an inflation swap one party pays a fixed rate and the other party receives inflation. [1]
By combining these with interest rate swaps, inflation-linked liabilities can be hedged. [1]
[Max 7]

- (iii) All else being equal, higher government bond yields would imply a lower cost of hedging as the fixed rate received would be higher. [1]

However, it is important to also consider the floating rate leg or financing cost. [1]

This may be lower for swaps than repos, [½]
resulting in offsetting savings that compensates for the lower yield. [1]

Additionally, repos are short-term contracts that need to be rolled at frequent intervals (e.g. 3 months) [1]

unlike swaps which can be held to the maturity of the cashflows. [1]

This creates two difficulties: the first is that the cost of future financing is uncertain, [1]

which leads to difficulty in comparing the cost of repos to swaps where the floating rate relative to standard market rates (e.g. LIBOR) is known. [1]

The second is that it is uncertain if it will be possible to roll over the repos until the fixed or inflation-linked liabilities are paid. [1]

If it is not possible to roll over the repos the underlying government bonds will need to be sold or cash sourced to buy out the repos.

[1, at least one approach mentioned]

Swaps are additionally not exposed to sovereign credit risk, unlike government bonds and repos. [1]

Swaps may also permit a closer match for the sensitivities of the liabilities to be achieved than a bond based hedge. [1]

[Max 6]

(iv) **Increased liabilities**

The liabilities could increase due to the cost of decommissioning rising faster than expected, [1]

...or the assumptions made about future cost increases. [½]

Even if the liabilities had been fully hedged against inflation, [½]

costs may not be precisely linked to the inflation measure that the hedge assets reference. [1]

Reduced levy income

Levy income could be lower than expected. [½]

This could be due to lower profitability which constrains ability to raise levies, shorter working lifetimes for plants, fewer plants being built, changes in tax treatment, or other government interventions. [½ × 4 factors]

Investment underperformance

The Fund's investments could underperform the rate of return assumed in the solvency calculation. [1]

This may be due to asset losses such as falling asset prices, defaults, or lower income proceeds than expected. [1 × 2 factors, with suitable examples]

It could also arise due to higher costs of financing in the hedge, higher investment expenses, higher taxes or active manager underperformance.
[1 × 2 factors, credit given for other relevant comments]
[Max 8]

(v) **Pros**

Costs – over the long-term, it is likely to be more cost-effective to build an internal team than employ a third party to oversee the assets. [1]
This is particularly the case as the Fund's assets grow over time. [½]

Expertise – by building up an internal team, the Fund will benefit from having dedicated staff who are familiar with the Fund's specific issues. [1]
This is likely to improve governance and improve the ability of the Fund to deal with contingencies and matters arising. [1]

Cons

Costs – in the short-term it may be lower cost to employ a third party to manage the assets, [1]
particularly when assets are small. [½]

Expertise – by employing a third party, the Fund will be able to gain access to skilled expertise [1]
which it may otherwise have difficulty recruiting [½]
or keeping fully utilised. [½]
This is particularly the case when assets are low, [½]
or for asset classes with lower allocations. [½]

Flexibility – by employing a third party, the Fund is more easily able to change its staffing levels upwards or downwards [1]
since it would not need to hire staff or terminate their contracts when the Fund's requirements change. [½]

Investment strategy – the Fund's investment strategy is likely to be limited by the capabilities of the internal team, whereas employing third parties is likely to permit a wider range of strategies to be implemented. [1]

Credit given for other relevant comments.

[Max 8]

Question 2 was reasonably well answered. Part (i) was poorly answered, due to many candidates not considering the specific details provided in the question.

- Q3** (i) Diversification could be achieved in a forestry investment portfolio by:
- Investing in forestry in different **geographical** locations. [1]
This is likely to reduce the variance of the risks due to storms and forestry fires. [1]
 - Investing in different **species** of trees [1]
Having different species reduces the variance of the risks due to disease and various pests. [1]
 - Investing in forests with different **ages** so not all the timber produced would be coming to market at the same time. [1]
This reduces the variance of risk due to changes in timber prices. [1]
 - Investing in different **forestry funds** [½]
 - Investing in a mix of **open-ended** and **closed-ended** forestry funds to achieve diversification by age [1]
[Max 5]

- (ii) The investment characteristics of forestry investment are set out below:

Expected returns

Forestry has historically achieved a positive real return. [1]

Suitability: The positive real historical returns would suggest that forestry is a suitable investment for a pension scheme [1]

Nature of the investment

Forestry is a “real” asset, so likely to produce a real return over time. [1]

Historically timber prices have risen at a similar or faster rate than consumer prices over most time periods. [1]

Suitability: Forestry matches the real nature of most pension scheme liabilities [1]

but with some basis risk due to the liabilities being mostly linked to the cost of living and forestry returns being mostly linked to timber prices. [1]

Risk / Certainty

The historical standard deviation of forestry investment returns is in between that of equities and bonds. [1]

The main risk factors attached to investing in forestry are: agency risk, storm risk, fire risk, frost risk, disease risk, pest risk, regulatory risk and tax risk. [1 × 3 factors]

Suitability: The lower volatility of returns than equities is attractive for pension scheme investments. [1]

Term of the investment

Forestry is usually a long-term investment, producing cashflows at irregular intervals late in the investment period, typically between 20 and 35 years. [1]
Some forestry assets will also confer additional development rights. [1]

Suitability: This would make it a good match for longer-dated pension liabilities. [1]

Currency

Forestry investments are typically made in local currency, [½]
however timber is traded internationally so international timber prices should move in line with domestic timber prices over time. [1]

Suitability: possibly to match by currency. [½]
Investing abroad is likely to create currency risk but due to the global nature of timber markets, there is some degree of natural offset. [1]

Liquidity / marketability

Forestry investment is not a very liquid or marketable investment. [1]
The larger the investment the longer the time might be. [1]
During times of market distress both liquidity and marketability might become an issue. [1]

Suitability: pension funds that plan to invest in forestry will need to ensure that they have sufficient liquidity to support the planned investment. [1]

Expertise required

Investing in forestry can need resources/expertise to manage the investments if it is done directly. [1]
Whilst the day to day demands can be outsourced, a sound understanding of the asset class is necessary for prudential oversight. [1]

Suitability: the pension fund may not have the required expertise so may be reliant on agents which creates some agency risk. [1]

Valuation and administration

Specialist expertise is necessary for prudential valuation and the administration of forestry investments. [1]

Taxes

Forestry is usually a tax-free investment in most countries. [1]
However there is a risk that taxation rules could change over the long life of a timber investment. [½]

Statutory or regulatory issues

Statutory or regulatory issues might affect the forestry investment, particularly in countries that are politically unstable. [1]

Availability of investments / capacity issues

Putting a sizeable investment into a single forestry market might create capacity issues. [1]

Credit given for other relevant comments.

[Max 23]

(iii) **Suitability as a matching asset**

Index-linked bonds are a real asset linked to the consumer prices index. [1]

Forestry is also a real asset but linked to timber prices. [1]

As such there will be basis risk relative to a consumer prices index. [1]

Index-linked bonds can have long terms but perhaps not as long as the longest dated pension liabilities. [1]

Forestry assets are typically shorter maturity than the longest-dated bonds in many markets. [1]

However both are suitable for matching longer-dated cashflows. [1½]

Risk arising

Index linked bonds are exposed to default and downgrade risks [1]

Subject to basis risks and maturity mismatches with liabilities, [1]

a close liability match can be achieved. [1½]

Forestry assets are exposed to many risks. [1½]

Whilst these risks are often uncorrelated to economic factors, perils such as storm and fire can result in big losses comparable to a default. [1]

Disease or pests can result in losses similar to a downgrade. [1]

Forestry investment is likely to experience significantly higher agency risk than index-linked bonds. [1]

Potential merit

At current real yields index-linked bonds are likely to produce very low real returns. [1]

However they may provide more effective protection than forestry against unexpected inflation. [1]

Forestry real yields are significantly higher than index-linked bond real yields. [1]

Subject to it being a suitable investment for the pension scheme, forestry offers the possibility of higher real returns with some liability matching characteristics [1]

Credit given for other relevant comments

[Max 12]

Question 3 was reasonably well answered. Part (ii) was the least well answered part, despite the wide range of answers that were given credit in the solution.

END OF EXAMINERS' REPORT