

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

April 2020 Examinations

Subject SA7 – Investment and Finance Advanced

Introduction

The Examiners' Report is written by the Chief 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.

Mike Hammer
Chair of the Board of Examiners

July 2020

© Institute and Faculty of Actuaries

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

1. The aim of the Investment and Finance Advanced subject is for the student to develop a broad working understanding of financial and investment markets, across all major areas of investment expertise. The aim is to achieve expertise up to a level that allows for critical analysis of others, rather than up to the level of full expertise in any particular area. This might be considered the level of expertise needed to be a Chief Investment Officer (CIO) of an investment management organisation or to hold a comparable role in a financial institution with significant involvement in financial markets.
2. Candidates should 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. Comments on *student performance in this diet of the examination*

This paper was reasonably well answered although the pass rate was slightly lower than in recent diets. This reflected that candidates scored relatively less well on application and higher order questions, partially offset by better than average scores on knowledge questions.

C. Pass Mark

The pass mark for this exam was 62.

92 candidates presented themselves and 36 passed.

Solutions

Q1

(i)

(a)

Quantitative Tightening (QT) is likely to cause asset price deflation. [1]

This is because the central bank's sale of bonds (and/or other assets) drags down bond prices (and/or other asset prices). [1]

This then causes a ripple of asset price decreases in other asset markets as the buyers of the bonds look to sell other assets, and the buyers of these assets further look to sell other assets.

[1]

Speculation will further add to the asset price deflation.

[1]

[Max 3]

(b)

Asset owners will see their wealth decrease. [1]

This would cause a negative wealth effect. [1]

Those with no assets will see no losses. [0.5]

They will be relatively better off having not participated in the negative wealth effect. [1]

The overall result is likely to be a decrease in economic inequality. [1]

[Max 3]

(c)

Economic growth is likely to decrease relative to its previous likely path. [1]

This is due to the negative wealth effect created. [1]

Those who experience wealth losses will have lower purchasing power and the economic activity reduction caused by this should also mean decreased employment. [1]

The impact will mostly be in areas with a higher concentration of asset owners. [1]

Those without assets will lose from seeing less jobs than otherwise being created, as the reduction in wealth 'trickles down' to them. [1]

[Max 3]

(d)

Consumer price inflation rates are likely to be little affected – as less well-off people will not see any significant losses from QT. [1]

Prices for luxury goods are likely to be more impacted than consumer necessities, due to greater elasticity of demand. [1]

The Central Bank is likely to be implementing QT because it believes the economy has recovered, in which case it expects some inflation to arise. [1]

This policy is likely to reduce the inflationary pressures. [1]

[Max 3]

(e)

The Central Bank is likely expecting some economic recovery – which should entail some wage inflation pressures. [1]

This policy should reduce those pressures relatively speaking. [1]

Nominal wages should see a relatively small and marginal negative impact. [1]

The impact will be greatest in those industries supplying goods and services to the wealthy [1]

Real wage increases may be larger due to decreased asset prices – so the purchasing power of real wages may be higher. [1]

[Max 3]

[Max 12 overall]

(ii)

QE is likely to have pushed asset values above their fair value. [1]

Arguably it creates bubbles. [0.5]

This is by creating a gap between their market prices and their true longer-term values. [1]

This creates the potential for a sharp reversion of market prices to their mean values. [1]

Greed is arguably a slower emotion and driving force than fear – so stocks generally fall faster than they rise. [1]

Expecting asset prices to gradually decline in response to QT in the same manner as they rose in response to QE is not consistent with the emotions involved and their resulting behaviours. [1]

QE is likely to have created some economic growth from the wealth illusion created for those who are richer and from the lower real wages that become accepted by those who are less asset rich. [1.5]

This is likely to have supported some of the rise in asset prices. [1]

However, if it goes into reverse, it increases the gap between market prices and the true longer-term fair values of assets. [1]

Speculators are likely to have front run the impact of QE. [1]

This would be adding to the bubble effects of QE. [1]

To the extent that these are likely to begin front running QT, they will exacerbate the impact of QT on market prices. [1]

Many economic projects will have been signed off under a basis of low interest rates – to the extent that interest rates rise – these projects will no longer be economically worthwhile – and will be exposed as being somewhat foolish. [1.5]

[Max 11. Credit given for other relevant comments]

(iii)

Possible strategies:

- Increase holdings of cash.
- Reduce duration of bond assets.
- Diversify from domestic to overseas assets (both equities and bonds).
- Buy payer swaptions that rise in value when interest rates rise.
- Buy equity protection using options.
- Reduce risk budget allocated to equity and credit, in favour of illiquidity, skill-based and other risk premia.
- Within the equity and bond portfolios, select issuers that will suffer less or benefit from a rising interest rates environment, for example financials.

[1 mark per point, max 5. Credit given for other relevant comments]

(iv)

The impact will depend on a bank's cost of capital. [0.5]

However, it would be expected that banks would seek to optimise their use of capital over time. [0.5]

Positive consequences:

- Banks will be less incentivised to deploy capital in lower risk activities such as derivatives and securities trading, secured financing and short-term deposits and investment banking activities. [1]
- This will incentivise them to lend money to the public and private sectors and individuals, [1] particularly in the format of unsecured loans or other similar facilities (eg overdrafts, credit cards, personal loans). [1, at least one example needed]
- Property development and infrastructure finance is unlikely to be impacted since whilst it is secured it is typically treated as a medium to high risk activity. [1]
- Banks may require additional funds, leading to increased deposit interest rates until funding requirements have stabilised. [1]

Negative consequences:

- Banks may underprice riskier forms of credit (eg overdrafts, credit cards, personal loans) as they realign their businesses to ensure that their funds are effectively deployed. [1] This effect could persist for several years. [0.5]
- Investment banking and other low risk activities may migrate to other jurisdictions where the capital treatment is more favourable. [1]
- Clients who require such finance (eg financial institutions borrowing via the repo markets) will find their costs are higher or their access to finance is restricted. [1]
- Potentially the residential and commercial mortgage markets will be adversely affected with higher costs due to the additional capital requirements as a significant part of such lending is lower risk than unsecured lending. [1]

[Max 7]

[Total 35]

This question was reasonably well answered with most candidates scoring well in part (i). Answers to parts (ii) and (iv) were generally weak, perhaps as candidates focussed more on higher order skills in a slightly unfamiliar situation. Part (iii) was well answered although some candidates lost marks by not discussing as wide a range of investment strategies as they could have.

Q2

(i)

The principal aims of regulation are to:

- Correct market inefficiencies and to promote efficient and orderly markets. [1]
- Protect consumers of financial products. [1]
- Maintain confidence in the financial system. [1]
- Help reduce financial crime. [1]

[1 per point, max 3]

(ii)

CfDs and spread betting are considered to only be appropriate for disciplined investors. [1]
They enable the investor to leverage their investments making them significantly riskier. [1]
They have advantages as a method of investment as the investing costs are often lower than other methods of gaining exposure to an investment. [1]

They also have potential tax advantages as they are often taxed like gambling so profits are not subject to tax [1] – but losses cannot be offset either [0.5].

They can also open up market access to some investors who would find it too costly to invest otherwise. [1]

They can also sometimes provide a less expensive form of leverage. [0.5]

However, most investors do not fall into the disciplined investor category and so this form of investing is risky and dangerous. [1]

In this country, this fact might well be unknown to many using CfDs and spread betting due to their lack of financial education. [1]

The vast majority of people using their products in developed countries lose money [0.5] e.g. in the UK, the financial regulator estimates over 80% lose money [1].

Many other countries consider this form of investing to be pure gambling and make it illegal [1]. In some countries, it is considered worse than normal gambling. [0.5]

[Max 6. Credit given for other relevant comments]

(iii)

- Greater regulation – investment restrictions – like ESMA [1 for a good statement/reason]
- Outlaw/ban the products [1 for a good statement/reason]

[Max 2]

(iv)

Approximately 18.2145% ($1000 \times (1.182145)^{50} \approx 4.3\text{m}$) [1]

(v)

Approximately \$450,000 [1] ie \$4m less than without the charges [0.5]

Assuming a 2% base return, whereby 20% of outperformance above 2% is taken in charges each year. [1]

Accumulated fund = $1000 \times (1.18214 - 0.02 - 0.2 \times (0.18214 - 0.02))^{50}$ [2]
= \$445,028 [0.5]

[Max 4. Other reasonable approaches were also given credit, including if different assumptions made]

(vi)

The difference between the two accumulated funds is very significant. [1]

The fund with the charges only amounts to 10% of the fund without the charges [1.5]

The length of time of the investment and the single premium nature of the investment show the significance of the charges to a greater degree than for regular investments over shorter time periods [1.5]

[Max 3]

(vii)

Comment: a wide variety of answers could be given credit in this question. Relevant comments, particularly those backed up with supporting reasons or examples were given credit.

The existing financial regulations and professional guidance in the country should be considered to establish the existing status quo. [1]

A wide variety of different actions could be considered. [0.5]

Greater regulation is likely to be needed – there is a wide variety of options available. [1]

The regulator could prescribe the assumptions to be used in investment illustrations/projections [1]

For example, equities about have an assumed return of between 5% and 8% per annum. [1]

Different assumptions might be considered for different time periods due to the uncertainties involved in shorter-term risky investments. [1]

Alternatively, assumptions' guidance could be set out by the regulator. [1]

Or they could instruct professional bodies, to give guidance on the range of appropriate assumptions that could be used for illustrating investment returns. [1.5]

They could necessitate that deviation from the guidance be supported and opened to critical investigation by the regulator. [1]

The methodologies used to produce such assumptions could also be prescribed or included in professional guidance [1]

E.g. the rate of return assumed could be prescribed to be an Annual Percentage change Rate (APR). [1]

The regulator might enact a public education programme or advertising campaign regarding the importance of investment charges [1]

To many people a charge of 2% might seem small but this effectively halves the value of a pension fund investment over a person's lifetime. [1.5]

Fines or disciplinary actions for firms not in compliance with such regulations could be enacted. [1]

The establishment of a fund to compensation miss-sold investors could be considered – potentially funded by a levy on all investment funds. [1]

Consideration could be given to the existing vested interests in the industry [1] so as to determine the likely political economics constraints that need to be overcome to make any changes. [1]

Consideration could be given to engaging the political powers in the country to try to influence them of the need for any suggested changes [1] – explaining how it might be in their interest, e.g. as regards the national interest and in relation to them getting re-elected. [1]

[Max 11]

[Total 30]

This was the best answered question on the paper. Most candidates found parts (i) to (iv) straightforward, with a few candidates struggling with part (ii) perhaps due to unfamiliarity with the underlying investments. Parts (v) and (vi) were reasonably well answered, although some candidates made numerical errors or failed to accumulate performance fees correctly which lost them marks. Part (vii) was the lowest scoring part of this question, and many responses were insufficiently broad despite the very wide range of points made in the solution.

Q3

(i)

At the point where the accumulated funds are converted, the insurer has effectively sold a fixed coupon bond. [1]

Changes in the interest rate mean that price of this bond at the point of fund conversion would change. [1]

An increase in interest rates would lead to the price of the bond – and hence the liability – decreasing. [1]

While an interest rate decrease leads to an increase in the liability value. [1]

The interest rates used to discount the value of the liability at the point of conversion would also lead to a movement in value. [1]

The liability value on the balance sheet is based on the interest rates that prevail at the calculation date. [1]

Hence changes in interest rates will lead to the liability value to change. [1]

[Max 4]

(ii)

At the point of conversion, the insurer sells a fixed coupon bond. In order to limit the exposure to interest rate movements, they would need to receive fixed payments. [1]

The most appropriate swaption is a receiver swaption as its holder receives fixed payments in exchange for floating ones. [1]

[Max 2]

(iii)

- Production of liability and asset values
- Determination of Investment strategy
- Trade implementation / Risk management
- Trade monitoring / Governance
- Assessment of hedge effectiveness

[1/2 each, Max 2]

(iv)

The balance sheet management team will need to consider the following from an investment management perspective:

Production of liability and asset values

[Max 3]

- Which calculations should be performed?
- How often should calculations be performed?
- Should the current process and methodology be used, or a new process?
- Should the same systems be used or is investment in different systems required?
- How will derivatives be valued?

Investment Strategy

[Max 3]

- Key policies to be put in place (e.g. set limits, execution process, governance, reporting etc)
- Cleared or OTC derivatives?
- What counterparty restrictions are to be put in place?
- What derivative products and assets can be traded?
- What quantitative analysis will be used to determine the composition of the initial derivative portfolio?
- How will the portfolio be rebalanced over time?

Trade Implementation / Risk management

[Max 2]

- Trades need to be monitored to ensure they comply with relevant policies.
- Is input required on other regulatory or compliance issues?
- Operational controls and limits

Trade monitoring / Governance

[Max 3]

- What is the governance structure will be used to oversee and monitor trades?
- To what extent should the compliance and legal teams be involved?
- If the regulatory environment is rule-based the compliance team will be a big part of oversight.
- If regulatory environment is principles-based then the legal team will likely need to be involved when the initial framework to trade is put in place in order to provide their legal interpretation
- What will be the triggers for trade sign-off?

[1 mark for each relevant point, Max 8]

(v)

Team composition

- Should specialist traders be sought? (e.g. those who specialize within interest rate derivatives and/or swaptions?)
- Are quantitative analysts and research analysts required in addition to traders?
- Are business analysts who will deal with the valuation actuaries and accountants be required?
- Will separate staff be needed to analyse hedge performance?

Other

- Will there be separate support teams used (e.g. HR, IT)?

[1 mark for each relevant point, Max 2]

(vi)

The key parameters to be determined for the swaptions are the notional, the strike and the swap tenor. [1]

The policyholders can be grouped into tranches based on their age and life expectancy. [1]

For each tranche the estimated fund value at retirement will need to be calculated. [1] A stochastic calculation is necessary, [0.5] to capture the correlation / dependency structure between interest rates and other asset classes [1]. The model assumptions will involve expert judgement. [0.5]

The estimated future fund values can then be used to construct a cashflow profile to be hedged. [1]

A swaps profile will then need to be constructed. [0.5] There may not be an identical mapping of the cashflow profile to swap tenors depending on the tenors available. [1] This will comprise a series of notionals at each tenor point. [1]

The strikes for the swaptions should be set based on the interest rate projections under the stochastic model, [1] such that they limit balance sheet losses in adverse interest rate scenarios to an acceptable size. [1]

[Max 7]

(vii)

Other derivatives that could be included in the hedge portfolio:

- Swaps
- Longevity swaps
- Interest rate futures
- Equity total return swaps
- Equity options
- Equity-linked swaptions
- Interest rate caps
- Interest rate floors

[0.5 for each, max 2]

(viii)

The following difficulties will be encountered:

- Determining the notional amount for the swaptions will be difficult as this will be based on the fund values at retirement.
- These accumulated fund values will be path dependent
- It will be difficult to determine the appropriate time to start hedging given that the product is relatively new.
- The current models may not be appropriate in performing calculations within the required timescales.
- Multiple sensitivities will be required to determine appropriate derivatives to use when hedging.
- Calculation of the sensitivities required may be difficult using the current models.
- There may be a lack of appropriate expertise within the actuarial team.
- There may be a limited supply of interest derivatives in the local market.
- The scale of trading may be so large that the market prices may be impacted by single trades.
- Will the demand for the relevant derivatives be high?
- What will be the cost of purchasing the required derivatives?
- Rebalancing costs could be high, if less liquid derivatives are held or there is frequent rebalancing.

[1 mark each, credit given for other relevant comments, max 8]

[Total 35]

[Paper Total 100]

This was the least well answered question on the paper. Responses to parts (iv), (v), (vi) and (viii) were weak on average, with candidates generally finding the other parts more straightforward to answer. This seemed to reflect unfamiliarity with the material covering the organisation and structure of an asset management operation, which has not been examined recently. Responses to part (viii) often did not discuss a broad enough range of practical issues that can arise in managing interest rate risk using swaptions, which may reflect candidates' unfamiliarity with swaption-based strategies.

END OF EXAMINERS' REPORT