

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

April 2019 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 2019

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 generally 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 where more detailed application skills were being assessed or in applying theoretical principles to an unfamiliar scenario. Candidates generally made good attempts at parts of questions testing higher order skills.

C. Pass Mark

The Pass Mark for this exam was 61%.

Solutions for Subject SA7 – April 2019

Q1

- (i) Bid-offer spreads, the difference between the bid price and the offer [1]
 For example, a share price might have a 1% difference in price between the bid and the offer prices in the market. [1]
 Fees, to brokers, agents, advisors or consultants, directly related to the service provided. [1]
 Commissions, payments made in proportion to the size of the investment transaction, such as a 0.5% commission to a stockbroker. [1]
 Taxes, e.g. stamp duty [0.5]
 Administrative expenses involved in the processing and settlement of the transaction. [1]
 Indirect expenses of the agent for example if they are an investment manager, such as their own trading expenses, including any rebalancing expenses. [1]
 Payments may also be made directly or indirectly for research. [1]

[Max 4]

- (ii) \$10,000 invested at the start of each year for 40 years making an investment return of 7% per annum would amount to approximately \$2,136,000 at the end of 40 years. [1]

$$\$2,136,000 = \$10,000 * [(1.07)^{41} - 1.07] / 0.07 \quad [1]$$

With a 1% pa management fee this reduces to ~\$1,640,000, that is ~23% less [1]

$$\$1,640,000 \approx \$10,000 * [(1.06)^{41} - 1.06] / 0.06 \quad [1]$$

With a 0.5% pa management fee this reduces to ~\$1,870,000, that is ~12.5% less [1]

$$\$1,870,000 \approx \$10,000 * [(1.065)^{41} - 1.065] / 0.065 \quad [1]$$

Over the period of 40 years, the 1% charge per annum costs the investor ~\$500,000 [0.5]
 – that is more than the sum of the investments made (\$400,000). [0.5]

The 0.5% charge costs roughly half that ~\$250,000 [0.5]

[Max 6]

- (iii) The percentages look small but they have a big material impact on the size of the fund at the end of the 40 years. [1, credit given for other relevant comments]

- (iv) \$10,000 invested at the start of each year for 40 years making an investment return of 7% per annum less a 1% investment management charge and a 0.5% additional annual cost and a \$250 annual account fee would amount to approximately \$1,400,000 at the end of 40 years. [1]

The charges and costs would amount to costing \$730,000 for the investor [1]

Approximately 34% less than if there were no such charges or costs. [1]

$$\$1,400,000 \approx \$9,750 * [(1.055)^{41} - 1.055] / 0.055 \quad [1]$$

The annual account fee of \$250 is the least costly charge – amounting to an effective ~\$36,000 [1]

Using the additional services adds to the costs of investment and although the percentages look small but they have a big material impact on the size of the fund at the end of the 40 years. [1]

[Max 4]

(v) Before deciding whether to invest passively or actively, the individual should be advised to consider whether they judge the investment market in which they intend to make an investment to be either ‘efficient’ or “inefficient” [1]

In other words whether they think it’s possible to outperform or ‘beat’ the market. [1]

If the individual judges that the investment market is efficient, then the rational approach might be considered to use a passive investment manager. [1]

If it is judged that the investment market is inefficient, then an additional question needs to be considered. [1]

- Does the individual or group consider that they have a comparative advantage; [1]

- Or can obtain a comparative advantage, to pick a high performing investment manager; [1]

- To what extent do they consider that they have, or can get, such a comparative advantage. [1]

Competitive investors are all trying to pick the best investment managers – the consultant need to ask the investor to what extent does the individual consider that they can do this better than others? [1]

If the individual judges that they can do this, then the rational approach might be considered to use an active investment management. [1]

Otherwise, the decision is more complicated. [1]

They might consider using a passive investment manager and accept it might be the least-worst option to choose. [1]

Alternatively, they can, over time, attempt to build a comparative advantage, and aim to pick better performing investment managers. [1]

The individual might also aim to use the investment manager selection expertise of the investment consultant. [1]

Albeit, they also need to judge the extent to which the investment consultant has a comparative advantage at picking high performing investment managers. [1]

The country in which the investor lives might also impact their choice. [1]

Passive investment is popular in the US where many investors, believing in the efficiency of the market, accept that it is not possible for managers to consistently outperform and an efficient portfolio is one which tracks the market at the lowest possible cost. [1]

In the UK, passive management is also becoming more popular and a recent report by the Office of Fair Trading strongly recommended the use of index tracking funds for individual pension accounts. [1]

[Max 10. Other relevant comments were also given credit]

[Total 25]

This question was well answered by the majority of candidates. A few candidates were unable to carry out the numerical calculations, and therefore scored less well than others.

Q2

(i) Benchmark return is $0.2 \times 5\% + 0.2 \times 6\% + 0.3 \times 7\% + 0.3 \times 8\% = 6.7\%$. [1]

Portfolio return is $1,068 / 1000 = 6.8\%$ [1]

Total alpha = 0.1% [1]

(ii) Benchmark return West is 5.5% and East 7.5%. Actual sector allocation is 50/50 versus a benchmark of 40/60. Sector allocation return contributed therefore $50\% \times 5.5\% + 50\% \times 7.5\% = 6.5$ versus a benchmark of $40\% \times 5.5\% + 60\% \times 7.5\% = 6.7\%$ - sector allocation therefore detracted 0.20% from performance. **Sector allocation: -0.20%** [3]

Within West: Growth returned 5% and Value 6%. The actual allocation was 40/60 versus a benchmark allocation of 50/50. Style bias within West contributed therefore $40\% \times 5\% + 60\% \times 6\% = 5.6\%$ versus a benchmark of $50\% \times 5\% + 50\% \times 6\% = 5.5\%$. Within West style bias added 0.1%, as the allocation to West within the portfolio is 50% the effective addition to performance was 0.05%. **Style within West: 0.05%** [3]

Within East: Growth returned 7% and Value 8%. The actual allocation was 40/60 versus a benchmark allocation of 50/50. Style bias within East contributed therefore $40\% \times 7\% + 60\% \times 8\% = 7.6\%$ versus a benchmark of $50\% \times 7\% + 50\% \times 8\% = 7.5\%$. Within East style bias added 0.1%, as the allocation to East within the portfolio is 50% the effective addition to performance was 0.05%. **Style within East: 0.05%** [3]

Stock selection has to be 0.2% so that the attribution adds up to the total alpha, but this can also be separately calculated by assessing the stock selection in each of the four sub-groups and multiplying by the actual allocation to these, as follows: $0.2 \times 3\% + 0.3 \times 1\% + 0.2 \times (-2\%) + 0.3 \times (-1\%) = 0.2$. **Stock selection: 0.20%** [3]

[Max 9]

(iii) It is important to perform style analysis so that the investor can determine whether the manager is actually implementing the style that the investor would like to get exposure to. [1]

This is particularly so if the allocation has been driven by a belief that this style may outperform. [1]

Also, some managers are skilful in their style but may be less skilful at managing in a different style. [1]

“Style drift” can be an issue. [0.5]

It is also important to perform style analysis to consider diversification across the portfolio. [1]

This reduces concentration risks and the likelihood of several managers underperforming simultaneously. [1]

Style analysis also provides insight into the drivers of returns generated and whether this is due to style bias or stock selection for example. [1]

[Max 5]

(iv) Growth stocks tend to be more sensitive to future growth expectations. [1]

When the economy is doing well in general and the economy is expanding growth stocks tend to do even better and may outperform Value stocks. [1]

Value stocks tend to do better in more recessionary economic environments or periods of increased uncertainty. [1]

This reflects their more defensive nature and more front-ended and certain nature of dividend payments. [1]

Sector specific influences have a strong impact on the overall performance of Value stocks versus Growth stocks. [1]

The split between growth and value tends to be achieved by splitting a universe of stocks in half based on market-to-book ratios which naturally results in a strong sector bias. [1]

Growth stocks tend to include more stocks from the technology and healthcare sectors, such as Apple or Google. [1]

When one of these sectors does not do very well, such as for example during the tech bubble, the whole growth sector is likely to underperform the Value sector. [1]

Value stocks tend to include more stocks from the energy and financials sector, such as for example Exxon or JPMorgan. [1]

When financial stocks do not perform very well, such as for example during the financial crisis, the whole value sector is likely to underperform the Growth sector. [1]

Value stocks tend to be more bond-like, pay more dividends in the short term and are hence more sensitive to shorter term interest rates. [1]

When shorter term interest rates fall this may lead to Value stocks outperforming Growth (and vice versa when rate rise). [1]

Change in the shape of the interest rate curve also has an impact as Growth stocks tend to have more back-end loaded pay-off profiles. [1]

Therefore a fall (rise) in longer-dated interest rates may lead to Growth stocks outperforming (underperforming) Value stocks. [1]

[Max 9]

(v) **Pros**

- Ability to express negative views beyond no owning a security [1]
- Increased ability to hold relative value positions (e.g. long Google and short Amazon but overall market neutral) [1]
- Leading to increased alpha opportunity set [1]

Cons

- Investors may not be able to invest in the fund if they are restricted from investing in funds that are allowed to short equities [1]
- Complexity and costs of shorting equities [1]
- Risk of being squeezed (when it is difficult or costly to repurchase the stock to cover the short position) [1]

[Max 4]

(vi) Mark-to-market based performance measures may exhibit more volatility in returns [1]

potentially leading to investors taking less outright risk, [1]

hedging more risk, [1]

be less willing to deviate from a benchmark or take active risks, [1]

less interested in illiquid investments [1]

and less willing to take basis risks [1]

then would be optimal when considering the long-term horizon of the investments [1]

Periods of underperformance may also result in premature selling of investments [1]

[Max 5]

[Total 35]

This question was well answered by the majority of candidates. A number of candidates were unable to carry out the numerical calculations, and therefore scored less well than others.

Q3

(i) Income = \$95m - \$10m = \$85m

Maximum outgo = \$1m expenses + \$130m losses

\$46m needs to be raised by the SPV. [1]

(ii) Insurance risk – risk of claims being higher or lower than the best estimate figure of \$70m [0.5]

Due to the reinsurance contract, claims are capped at \$130m [1] subject to eligibility [0.5]

Investment risks – risk of gains or losses on the investments held by the SPV, [0.5]

funded from premiums, the capital provided by the security and any other assets held in the SPV. [1]

Counterparty risk – the SPV is exposed to losses in excess of \$130m figure in the event of reinsurer failure. [1]

Tax risks – if the tax treatment of the SPV was to change, this would impact on the returns that investors would receive. [1]

[Max 4]

- (iii) **Risk assessment** – this is a function of the estimated losses of the insurance portfolio [0.5]
and the uncertainties around this [0.5]
as well as the capital structure of the SPV [0.5]
and any subordination or seniority of the bond. [0.5]

Investor demand for insurance linked securities – this is a function of the capital that investors are willing to commit, [1]
including that held in queues at asset managers or other pools prior to investments being made. [0.5]
Some insurance risks are potentially in greater demand from investors due to their low correlation with financial risks. [1]
[Max 3]

- (iv) Many investors are seeking to maximise risk-adjusted returns, [0.5]
rather than the absolute level of return. [0.5]

Most investors with moderate to high return targets will have an existing allocation to listed equities, [1]
so their portfolios are already significantly exposed to equity risks. [0.5]
By investing in insurance linked securities, an investor is able to add risk factors to their portfolio that have a low correlation to equity or credit risks.

[1, either equity or credit can be named]

This reflects that the drivers of insurance linked returns are primarily insurance risks such as weather, fire, earthquake, hurricane, marine and so on.

[0.5 per example, maximum 3]

[Max 3]

(v) **Pros**

This structure gives a higher coupon rate, with some participation in insurance surplus. [1]
For an investor with a more clearly defined payout this structure will be more attractive.

[1]

If profits are in line with the average, the payout will be a little higher. [1]

Cons

There is less participation in profits. [1]

The insurer is being paid profit without putting up any risk capital. [1]

However the investor’s principal is still at risk. [1]

The 6% coupon rate may or may not be sufficient compensation for the lower participation rate in profits. [1]

Overall this structure is likely to be less attractive from an investor perspective since the principal is still fully at risk. [1]

[Max 5, Other reasonable answers were also given credit]

[Total 16]

This question was well answered by the majority of candidates. Parts (ii), (iii) and (iv) focused on higher order skills and were less well answered in general, perhaps due to the scenario being an unfamiliar one.

Q4

- (i) To minimise market impact. [1]
To help achieve an execution price as close to the market price as possible [0.5]
They also aim to disguise their deals. [1]
To stop market participants benefiting from any knowledge about another participant's desired trades. [1]
[Max 3]
- (ii) There are a number of methodologies for assessing how well the algorithms work. [1]
For example, assessing the size of the implementation shortfall. [1]
This is roughly the difference in the value of a notional portfolio with trades executed at the observed market price at the time of the deal and the value of the actual portfolio after the execution of the actual trades. [2]
The algorithms with the lowest implementation shortfall are considered to be superior. [1]
A significant challenge for algorithm trading is what is referred to as latency. [1]
This is the time difference between stimulus and response, between order generation and execution. [1]
Low latency is essential to prevent other market participants gaining a first- mover advantage and placing orders ahead of one's own. [1]
As a consequence, algorithmic traders sometimes invest large sums of money to marginally improve the speed (often in milli- or nanoseconds) of their IT and telecommunications systems solely to ensure that their orders are placed in the queue before other competing orders [2]
[Max 7]
- (iii) The Ego is a filter through which an individual sees the world. [1]
Nous is translated into English in a variety of ways – as ‘mind’, ‘thought’, ‘forethought’, ‘imagination’, ‘intuition’, ‘reflection’ and the ‘mind’s eye’ amongst others. [1 - not all words necessary to get the 1 mark]
Nous is the way in which an individual views or perceives the world. [1]
Logos is translated as ‘logic’ or ‘rational thinking’. [1]
It refers to the type of rational logic that could be understood by all. [1]
The function of Logos is to condition the mental picture created by Nous. [1]
Pyr is translated as ‘fire’, ‘fire in the belly’, ‘animal spirits’, or ‘impulse’. [1 - not all words necessary to get the 1 mark]

It refers to the light and energy used by the Psyche. [1]
[Max 4]

(iv) An individual with a ‘healthy’ Ego tends to see the world as it really is, and constructively tries to engage with the world. [1]

An individual with an ‘unhealthy’ Ego will use varying degrees of self-deception to excuse or justify their ‘reasoning ‘ or actions to make themselves feel better about the world. [1]

When an individual makes a judgment based partly on the way they are and partly on the way the world is, this is referred to as a rationalization. [1]

When an individual has an unhealthy Ego it can lead to incorrect rationalizations. [1]
[Max 3]

(v) Low level of application of Nous. [1]

Low level of application of Logos. [1]

(vi) Unskilled investors who get lucky typically lose more money from the overconfidence derived from their luck than they made from being lucky in the first place. [1]

As the investor has little knowledge or education, the investor is unlikely to have developed an astute overall perspective on the market (their Nous). [1]

And is unlikely to be applying a sufficiently disciplined approach (their Logos). [1]

The investor is displaying a degree of over-confidence in their approach – indicating that their luck might have gone to their head, likely creating an unhealthy ego. [1]

This is likely to result in un-astute investment decisions in the future. [1]

It can lead to decisions that are without an appropriate degree of humility. [1]

The investor could not only lose money in the future but also continue to build up losses unable to see the error of their ways due to their unhealthy ego. [1]

[Max 5, Other reasonable answers were also given credit]

[Total 24]

This question was the least well answered question of this paper. Very few candidates demonstrated a good understanding of algorithmic trading in the first half of the question, although most made good attempts at the second half of the question on investment psychology.

[Paper Total 100]

END OF EXAMINERS’ REPORT