

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

September 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
December 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 areas that have not been examined in the recent past. Candidates generally made good attempts at parts of questions testing higher order skills.

C. Pass Mark

The Pass Mark for this exam was 62.

Solutions for Subject SA7 – September 2019

Q1

(i)

The main type of advice is typically on setting investment strategy. [1]

For example

- Determining the asset allocation [0.5]
- Whether to follow an active or a passive management strategy [0.5]
- Implementing a risk budgeting strategy [0.5]
- Implementing a ESG strategy [0.5]
- Implementing core-satellite approaches [0.5]
- Implementing a fund-of-funds strategy [0.5]

The other main type is typically advice on investment manager selection. [1]

For example

- Picking an active or passive investment manager [0.5]
- Or giving advice related to the constructing of a fund-of-funds portfolio [0.5]

Implementing a transition management of funds from one investment manager to another [1]

[Max 5. Other relevant comments were also given credit]

(ii)

An investment advisor/consultant (IC) operates within a different narrative to a trader / investment manager (IM). [1]

The IM needs to differentiate investments (stocks, bonds, sectors, etc) according to their merit, [1]

and take more rapid decisions. [0.5]

An IC needs to apply strategic thinking to assess investment choices and risks. [1]

But also needs to be able to formulate this within their client's narrative. [1]

This adds an additional constraint to the process of establishing good advice to the client. [1]

The good investment advisor also needs to protect their clients from erroneous rationalisations. [1]

Erroneous rationalisations might make sense within their client's narrative but which may not make logical and rational sense to a neutral third party. [1]

ICs need to help clients create sound investment narratives and to construct processes within these narratives that the client can follow and use to make the best judgments [1]

ICs also need to protect clients from rogue operators. [1]

These operators can use their client's erroneous rationalisations to sell them advice or investment products that do not have merit. [1]

An IC needs to have strong interpersonal and communication skills to persuade their client of their point of view. [1]

[Max 7. Other relevant comments were also given credit]

[Total 12]

This question was the least well answered one on this paper, perhaps because it covered topics that have not been examined recently.

Q2

(i)

A typical risk model will have an expected return [0.5]

and a volatility assumption [0.5]

for each asset class.

The model will also contain correlation assumptions between asset classes. [1]

Some models are stochastic and incorporate a large number of simulations, whereas others are much simpler in structure. [1]

By running a portfolio of assets through a risk model its risk and return characteristics can be better understood. [1]

[Max 3]

(ii)

Risk budgeting refers to the process of understanding the contribution to portfolio risk from different asset classes, using a risk model. [1]

The model may also attribute risk into strategic, active and other components. [1]

Further analysis can also help decide how much risk to take [0.5] or where it is most efficient to take the risk. [0.5]

Typical analyses include how to minimise the risk for a given level of target return, [1]

or to maximise the target return for a given level of risk. [1]

[Max 4]

(iii)

The drawbacks of Risk Parity are as follows:

- This approach is arguably pro-cyclical. [1]
- For example, if equities or another portfolio rise in price, their volatility usually drops, so risk parity funds would buy more stocks. [1]
- If equities fall sharply or crash, volatility will spike, so risk parity funds will sell. [1]
- Portfolios are generally leveraged, leading to greater dependence on liquidity. [1]
- Due to the need to rebalance as volatility changes, transactions costs can be high. [1]
- Performance measurement is not straightforward due to use of leverage and different approaches taken by competing strategies. [1]

Furthermore, many such funds use relatively short-term measures of risk, e.g. based on the last five years return data. [1]

These funds may only be taking into account a recent bull market within their investment process or models [1]

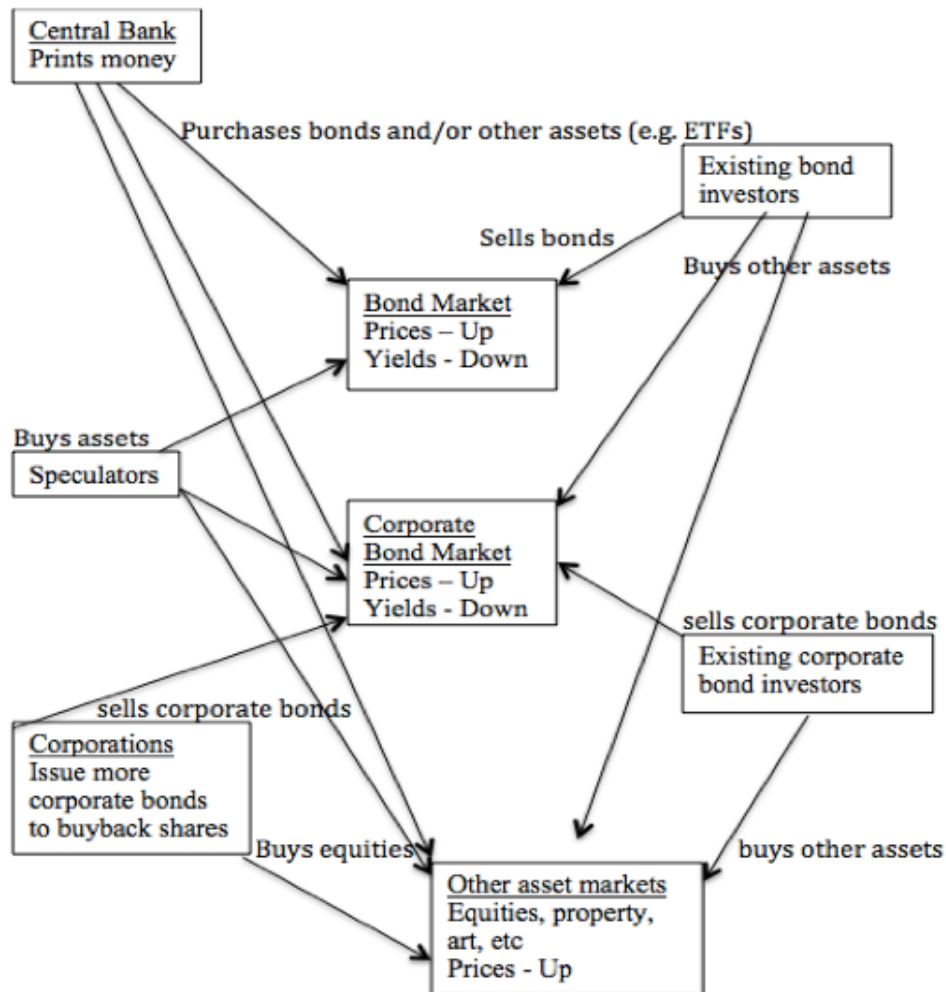
and their narrative does not include significant market corrections or regime changes. [1]

This exposes them to being substantially misallocated in the event of a significant change in the economic regime, [1]

particularly where this results in changes in observed volatility or correlations. [1]

[Max 5. Other relevant comments were also given credit]

(iv) Taken from Core Reading, Unit 8, Section 4.3



[1 mark for each box and each arrow. Max 9. Other relevant comments, e.g. impact on liquidity, were also given credit]

(v)

QE is likely to push asset prices higher [0.5]

and also reduce asset price volatility. [0.5]

QE is arguably likely to result in asset price bubbles as asset prices are pushed out of line from their intrinsic values. [1]

Risk parity funds are likely to take increasing risk as a result [0.5]

to maintain a given level of volatility. [0.5]

Risk parity funds will amplify the pro-cyclical issues arising from QE. [1]

[Max 2]

(vi)

A “pure” risk parity portfolio will often include leveraged allocations to asset classes that have exhibited low risk in the recent past. [1]

Under the risk model, such allocations will consume relatively little risk budget for their expected return contribution. [1]

Similarly, asset classes that have had low correlations to other asset classes will also have increased allocations. [1]

This makes the resulting portfolios vulnerable to larger than expected losses in the event of changing levels of risk or correlations. [1]

Daily collateralisation of derivatives increases liquidity risks. [1]

Possible solutions to these issues can include the following:

- Limitations on the use of leverage, both at an asset class level and at a total portfolio level. [1]
- Maintaining a highly liquid portfolio to avoid the risk of forced asset sales due to losses on leveraged exposures. [1]
- Using options to enter into leveraged exposures to limit the losses in negative scenarios. [1]
- Sensitivity testing, or using different historic datasets to test the portfolio. [1]
- Building more detailed models that better capture correlations in tail scenarios and/or better represent tail risks within an asset class. [1]

[Max 7, credit given for other relevant comments]

[Total 30]

Candidates generally scored reasonably well on this question, however parts (ii) and (iii) were poorly answered. This may reflect a lack of familiarity with how risk parity strategies use risk budgeting techniques to construct leveraged portfolios of diversified assets.

Q3

(i)

- Client's Personal Details (such as):
 - Age
 - Occupation
 - Number of Dependants
 - Health Issues
- Client's Financial Details (such as):
 - Earnings
 - Savings
 - Investments
 - Level of current debt
- Details related to investment goals (such as):
 - Investment goal
 - Investment horizon
 - Attitude to risk
 - Capacity to bear loss
 - Amount of new investment

[0.5 per point, Max 4]

(ii)

- The product's terms and conditions (such as requirement to pay premiums, under what circumstances money can be withdrawn etc.).
- The flexibility, if any, to change payments or benefits.
- The inherent risks – including asset allocation and structural risks such as counter-party risk.
- The term (in other words, the duration of the investment).
- The expected return.
- The charges applied by the product provider.

[0.5 per point, Max 2]

(iii)

(a)

An investor's net worth is the difference between their assets and liabilities [1]

The investor's liabilities will include expected future cost of living, which will depend on their life-stage, lifestyle and lifestyle aspirations. [1]

The main elements of an individual's assets are:

- **Financial capital** – any existing assets / wealth; the source of this wealth may also be relevant.
- **Human capital** – likely future earnings.
- **Significant future inflows** – for example an anticipated inheritance or legal settlement.

[1 each, ½ for element, ½ for example]

The main elements of an individual's liabilities and expected future cost of living would include:

- Food, clothing and other basic living expenses.
- Home expenses – rents or mortgage repayments.
- Other debt repayments – e.g. student or other loans.
- Children's education and health expenses.
- Transportation costs.
- Lifestyle expenses – e.g. holidays.
- Retirement expenses.
- Aspirational items – e.g. future family transfers, early retirement, new car.
- Emergency – e.g. accidents, repairs, home refurbishments.
- Other unique elements related to the individual's circumstances.

[0.5 each, max 3]

[Max 7]

(b)

The greater the size of an individual's net worth, the greater will be their ability to bear loss. [1]

An increased ability to bear loss will increase their ability to take risk or their ability to tolerate greater asset price volatility. [1 for either description]

The target market is young and is unlikely to have significant financial capital [1]

Their main asset will be human capital which means the largest risk to an individual is losing their job, resulting in the loss of earnings. [1]

The lack of financial capital means it is unlikely that the target market will be able to invest large sums. [1]

Liability outgo for this target market is often more predictable and may also be easier to control (by avoiding or postponing expenditure). [1]

Certain large unknowns can be managed through insurance products, albeit at the cost of insurance premiums. [1]

People in the target market will want to have some liquid savings to cover short-term requirements, [1]

and some longer-term savings that could be less liquid. [1]

Higher net worth individuals are likely to have higher savings [0.5]

and therefore can tolerate greater illiquidity. [0.5]

[Max 5, credit was given for other relevant comments e.g. tax efficiency]

(iv)

The risk tolerance for an individual is their willingness to bear risk as determined by a particular risk metric (e.g. fund volatility, VaR, etc.) [1]

Risk tolerance is impacted by an investor's willingness to take risk as well as their ability to take risk. [1]

An investor's risk comfort (i.e. their response to periods of poor performance) will also impact risk tolerance. [1]

Risk tolerance will tend to be over/understated when volatility is low/high. [1]

Longer horizons mean there is more time for losses to be recovered, meaning higher risk tolerance. [1]

A number of considerations will impact the investment portfolio make-up and these include the following:

- Desired liquidity
- Investment time horizon
- Whether fund is open to new investments
- Minimum investment requirements
- Environmental and social considerations
- Investment advisor constrained to recommending specific funds?
- Suitability of products (i.e. some products may be deemed complex or niche).
- Trading costs
- Diversification with other eligible products/funds
- Transparency of funds/products
- Expertise of WealthCo could mean a specific focus on specific asset classes more than others

[0.5 each, max 2]

[Max 4]

(v)

Splitting the risk metric range into 2 buckets is not appropriate [1]
as the variation in risk tolerance within each risk bucket is likely to be large.

[1]

The risk metric used by the external software will need to be customised [1]
to ensure it aligns with that used by WealthCo, [0.5]

Investment portfolios manufactured by internal asset manager may not be appropriate for the following reasons:

- Portfolios may include inappropriate assets as they were not created with the needs of this particular target market in mind. [1]
- Portfolios may not meet the needs of the target market (e.g. no income, limited upside). [1]
- Limited range of investment options [1]
- High charges [1]
- Inappropriate management style [0.5]
- Not taking into account other details captured in the fact find, e.g. views on active vs passive management, ESG beliefs, etc. [1]

[Max 7]

(vi)

The first step would be to define the categories according to a relevant risk metric such as volatility/VaR/TVaR. [1]

This will typically involve determining the minimum and maximum for the risk metric (e.g. volatility) and splitting that range into five non-overlapping ranges. [1]

The asset allocations will not constitute a range, hence a single risk metric reference point will be required for each of the five categories. [1]

The mid-point within each range can be used as the reference which defines the asset allocation for each category. [0.5]

Alternatives would be to use the lower/upper boundary of the ranges of each of the five risk tolerance categories. [0.5]

Next would be to determining the eligible asset/fund universe. [0.5]

A method on how to calculate the risk metric for each of the eligible assets, as well as for all possible combination would then to be agreed upon. [1]

This could be based on a simple formulaic approach. [0.5]

Stochastic simulation is typically used when the risk metric is VaR/TVaR [1]

Key inputs into the calculation of the risk metric are required and these are typically the following:

- Expected return
- Forward-Looking volatility
- Correlations
- Return distribution assumptions
- Copula parameters where more complex dependence structures are used for simulation.

[0.5 each, max 2]

These assumptions are typically calculated on the basis of analysis carried out on historical data. [0.5]

With adjustments made to the historical analysis results based on prior views in order to get forward looking estimates. [1]

The next step is to calculate the risk metric using the relevant assumptions and calculation method for each asset and all possible combinations of assets. [1]

There will be various constraints included in the calculation (e.g. maximum/minimum allocation to certain assets, no short selling, etc.) [0.5]

Minimum increments may be used to limit the number of portfolios assessed during calculation. [0.5]

A numerical algorithm is then used to determine the portfolio which has the highest expected return given that the target risk metric has been achieved for each of the five risk tolerance categories. [1]

[Max 10]

(vii)

The SAA can be used as a benchmark by comparing the performance of a fund based on its composition with the performance of funds chosen by individuals.

[Max 1]

(viii)

The suggested management style is appropriate if the main goal is to ensure that the client's portfolio is aligned with their risk tolerance. [0.5]

However, this is only the case if the calculation to determine the SAA also allowed for annual rebalancing or used fixed allocations through time. [1]

Depending on the relative performance of the assets, annual rebalancing may lead to higher costs and lower net returns. [1]

Since the SAAs are constructed based on a single point within a range for the risk tolerance categories, it is not always necessary to have fixed allocations for a portfolio to align with a specific category. [1]

The expectation for some investors may be to align with the risk metric only at the point of initial investment. In such cases it would not be appropriate for regular rebalancing. [1]

Alternative strategies may be more appropriate than annual rebalancing (e.g. tactical allocations using derivative overlays). [0.5]
[Max 3]

[Total 43]

This question was well answered by the majority of candidates. A number of candidates scored poorly on part (vi) as they were not able to provide a clearly reasoned alternative approach to the one described in the question.

Q4

(i)

Exchange traded derivatives

- Standardised derivatives contracts
- Available on product types with high levels of supply and demand
- High liquidity
- Limited flexibility in strikes, tenors, etc
- Counterparty risk mitigated through margining which is held at the exchange
- Traded on an organised exchange / marketplace

OTC derivatives

- Bilateral transactions between 2 counterparties
- Each party is exposed to the credit risk of the other
- Counterparty risk is usually mitigated through collateralisation
- Lower liquidity (generally)
- High degree of flexibility in contract parameters

[0.5 per point]

Many OTC derivatives can be cleared, leading to similarities with exchange traded derivatives and reduced counterparty risk. [1]

[Max 4]

(ii)

- margin is held "in trust", i.e. away from the member or customer's other assets
- exchange requires initial margin from its member, who in turn demands (usually larger) initial margin from its customers
- if market moves against a member (whether this is a customer position or a proprietary position doesn't matter) then in the first instance the initial margin posted by the member can be used by the clearing house to offset any losses suffered by the member
- in due course (normally later that same day) the member must make good the day's losses by posting additional variation margin
- the initial margin is then "released" to be re-used the following day
- if the member does not provide the variation margin, the clearing house can keep (the necessary part of) the initial margin and the contract is typically terminated
- therefore the counterparty to the trade is not exposed to the member's inability to pay
- the exchange will determine what assets can be supplied as margin and what haircuts will apply

[1 per point, max 5]

(iii)

a protective put

- this is a classic insurance scenario – if the asset rises in value, the put option becomes increasingly worthless (a cost like an insurance premium) however if the asset falls, the put option will become worth more and more and offset the fall in value of the asset (like an insurance claim) [1]
- a protective put is a very effective way to hedge portfolio risk for most situations (since the asset holder is likely to have long to the underlying) [1]

[max 2]

a covered long call

- if the asset price rises the option allows the holder (who is not the asset holder in this scenario) to purchase the underlying asset at the pre-agreed price [1]
- it therefore protects against an unexpected *rise* in asset prices [1]
- ... but does not explicitly hedge any existing positions in the portfolio [1]

[max 2]

a straddle

- if the asset price rises sharply, the call option goes in-the-money while the put option becomes worthless; and vice versa [1]
- therefore any large movement in either direction results in a payout [1]
- the existing positions in the portfolio will have net exposure in one direction or the other (not both); therefore one of the pair in the straddle would hedge (i.e. negate) the movement whereas the other of the pair would resemble a naked "trading" position [1]
- the ability to hedge portfolio positions is therefore doubtful beyond hedging small price movements in either direction [1]

[max 2]

[Other relevant comments were also given credit, including 1 mark for drawing payoff charts highlighting where protection would apply]

[Max 6]

[Total 15]

This was the best answered question on the paper, reflecting candidates familiarity with the topics. Some candidates scored poorly on part (ii) as they did not provide sufficiently detailed explanations of margining and counterparty risk management through collateralisation.

[Paper Total 100]

END OF EXAMINERS' REPORT