INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

April 2021

Subject SP5 - Investment and Finance Specialist Principles

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.

Paul Nicholas
Chair of the Board of Examiners
July 2021

© Institute and Faculty of Actuaries

 © Institute and Faculty of Actuaries

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

1. The aim of this Investment and Finance Principles subject is to instil in successful candidates the ability to apply, in simple situations, the principles of actuarial planning and control to the appraisal of investments, and to the selection and management of investments appropriate to the needs of investors.

2. A mix of questions styles is used, covering *knowledge* of the material set out in Core Reading, *application* of this in calculations and case studies and *higher order skills* such as synthesis and collation of recommendations. Marks are awarded for the constituent elements of calculations, not just for the final answer generated. Scenario appraisal will similarly provide credit for evidence of the issues considered, not solely for the conclusions reached.

3. Candidates who give well-reasoned points, not in the marking schedule, are awarded marks for doing so.

4. The examiners want to test the understanding of the candidates in relation to the principles of investment. In order to do that the candidates will be asked to demonstrate that they know how investors might behave and what various terms mean. It also requires candidates to calculate and interpret certain investment related figures. It is not expected that the candidates are experts in the investment area, however they should have an overall understanding of investment markets and the function and needs of the various parties involved.

B. Comments on *candidates' performance in this diet of the examination*

1. This paper was the first SP5 paper specifically written to be taken in an open book environment. This has resulted in knowledge based parts of questions being more integrated into questions, the aim being to eliminate, or at least reduce, the opportunities to copy parts of the core reading into the answers. It would seem that the result has been that candidates have found this more challenging, despite the large number of extra marks being available. Question 3 proved particularly challenging; this may be because it is a relatively new area and it is not always black and white, what is acceptable to one person may not be to another.

C. Pass Mark

The pass mark for this exam was 55.
280 presented themselves and 122 passed.

 © Institute and Faculty of Actuaries

Solutions for Subject SP5 – April 2021

Q1

(i)

The most likely reason is that of primacy [½]
people often select the first item on a list [½]

(ii)

The main problem is how to present the information in such a way as to remove or at least reduce people's behavioural biases [1]
It maybe that the client is not an experienced investor and lacks the knowledge to make an informed decision [½]
They may lack the time and motivation to consider the funds in detail [½]
and enable them to choose the most appropriate fund [½]
In this case there a number of options [½]
And there are a number of behavioural traits that may come into play apart from [½]
primacy which was described above. [½]
The clients may choose the last option (recency effect) [½]
Or in some cases they are likely to choose something in the middle, the intermediate option [½]
If they know lots of other people have chosen a particular fund, they may also do this – herd behaviour [½]
Equally they may feel that by not choosing the popular fund they will regret their decision – regret aversion [½]
The investment company also wants to avoid framing the question and thus guiding the client towards a particular selection [½]

½ can be given for a well-argued case for another behavioural bias not mentioned above

[Marks available 6½, maximum 3]

(iii)

The influence of behavioural biases might be reduced by the use of a flow chart or a series of questions so depending on their answers clients are directed towards a particular fund [1]

Any reasonable answer will be accepted.

(iv)

According to behavioural economics there are a number of reasons for overtrading:
First the investor may be overconfident in their own ability [½]
The over confidence causes the investor to trade aggressively [½]
Given their own confidence in their ability the more trading they do the greater the profits [½]
Another reason is loss aversion [½]
the investor is more sensitive to losses than gains and may sell stocks that have fallen rather than wait for them to recover [½]
Linked to this is myopic loss aversion [½]
where investors become less risk averse the shorter the reporting period [½]
In this case the investor is likely to have a very short reporting period given that they are overtrading and in order to trade they probably look at their portfolio [½]

 © Institute and Faculty of Actuaries

They could be checking their portfolio too often [½]
Loss aversion might mean that when faced with a loss the investor may be tempted to trade more aggressively to recoup the loss [½]
Or by trading frequently any losses are likely to be smaller [½]
Herd behaviour might also be an influence [½]
If everyone else the investor knows is trading excessively they will be tempted to do likewise [½]
It could also be that they are overly optimistic and believe their luck will change enabling them to recoup their losses [½]
Hindsight bias could be an influence, looking back the investor thinks the losses were predictable, despite not predicting them at the time, so future losses will be predictable [½]
[Marks available 7½, maximum 3]

(v)
The investor needs to acknowledge the problem [½]
The investor should look at the returns their portfolio has generated compared to their expectations [½]
The investor could check their positions less frequently [½]
If performance falls short then they should acknowledge they may not be as good as they thought they were [½]
They could start to follow a set of trading rules which they would aim to follow [½]
e.g have buy & sell target prices or triggers [½]
Conduct more research before buying or selling [½]
Limit the amount they deal in any one week [½]
They could discuss their ideas with others to get another opinion. [½]
The investor could become more educated about behavioural biases [½]
Or undertake some training relating to behavioural finance so they understand the issues [½]
They could employ an expert to manage their money [½]
[Marks available 6, maximum 2]
[Total 10]

This question was generally well answered by most candidates. Despite any reasonable answer being accepted in part (iii), a surprising number of candidates failed to gain the full mark.

Q2
(i)
The index needs to:
Be frequently calculated [½]
Be publicly available [½]
Have a broad coverage i.e. representative of the equity market [½]
And to reflect the movements in the equity market [½]
It therefore needs to be rebalanced when appropriate [½]
Be transparent i.e. rules are readily available [½]
Be replicable [½]

 © Institute and Faculty of Actuaries

Be weighted [½]
e.g. Weighted arithmetic index [½]
with weights based on market capitalisations [½]
Take account of income [½]
Allow for new entrants and exits [½]
It needs to be chain linked to ensure continuity [½]
[Marks available 6 ½, maximum 3]

(ii)

Company	Initial Market Cap	Formula to determine market cap at end day 1	End day 1 market cap
1	350	=350*2.05/2	358.75
2	200	=200*1.7/1.75	194.29
3	650	=650*1.6/1.5	693.33
4	400	=400*3/3	400.00
5	450	=450*0.8/0.75	480.00
Total	2050		2126.37

Percentage change = 2126.37/2050-1 = 3.725%
Index at end of day 1 = 1000*(1+0.03725) = 1037.25

1 mark for correct method & 1 mark for correct calculation. If the candidate makes a mistake in calculation deduct ½; if they make two or more mistakes, no mark for calculation is awarded.
[2]

(iii)

Company	Market Cap at end day 1	Formula to determine market cap at end day 2	End day 2 market cap
1	358.75	=358.75*2.05/2.05	358.75
2	194.29	=194.29*1.65/1.7	188.57
3	693.33	=693.33*1.55/1.6	671.67
4	400.00	=400*2.95/3	393.33
5	480.00	=480*0.75/0.8	450.00
Total	2126.37		2062.32

Percentage change = 2062.32/2126.37-1= -3.012%
Index at end of day 2 = 1037.25*(1-0.03125) = 1006.01
1 mark for correct method & 1 mark for correct calculation. If the candidate makes a mistake in calculation deduct ½; if they make two or more mistakes, no mark for calculation is awarded.
[2]

(iv)
The total return is given by:
TRI(t) = TRI(t-1) x I(t)/ {I(t-1)-[XD(t)-XD(t-1)} [½]

 © Institute and Faculty of Actuaries

No stocks go ex-dividend until on day 1, so the total return on day 1 is the same as the capital return [½]

The income received by investors from stocks going ex-dividend at the start of day 2 is calculated by multiplying the dividend per share by the number of shares
The number of shares is calculated by dividing the market capitalisation by the share price
Two stocks went ex-dividend, 2 & 5

Company	Number of shares (m)	Formula for total dividend paid (€m)	Total Dividend Paid
2	114.29	=114.29*0.05	5.7143
5	600	=600*0.06	36
Total			41.7143

The income is assumed to be reinvested back into the index. [½]
XD (t) = 41.7143*1000/2050 = 20.35 [½]
XD (t-1) = 0 [½]
TRI (t) = 1037.25*1006.01/(1037.25-20.35) = 1026.142 [2]
Therefore total return over the two days is = 1026.142/1000 – 1 = 2.61% [½]

Just stating the correct answer gains full marks. If the answer is incorrect then the marks above apply where applicable

[Marks available 5, maximum 4]

(v)
The issues facing a new stock exchange are:
The small number of stocks that are initially quoted may discourage investors from trading on the new exchange [½]
And the index could be heavily influenced by the movements of one stock [½]
There may not be much information [½]
And there is no history to look at [½]
Liquidity [½]
Will the shares be sufficiently traded on the new exchange [½]
Is there sufficient free float to allow these companies to trade [½]
If not they may be very volatile with the price moving a lot on thin volumes [½]
Are there lots of competing exchanges [½]
Are the companies also quoted elsewhere [½]
Security [½]
Will arrangements for custody etc. be sufficiently secure [½]
Cost [½]
Will the costs of listing be attractive to companies [½]
Likewise what costs will investors face [½]
Listing regulations [½]
Will the listing regulations be sufficient to command investor confidence i.e are they strict enough [½]
Are the listing regulations too onerous to attract new companies [½]
Performance [½]

 © Institute and Faculty of Actuaries

Political stability [½]
Is the establishment of the stock exchange supported by both the government and the opposition [½]
Legal framework [½]
Is the country's legal framework robust [½]

[Marks available 11½, maximum 3]

[Total 14]

Again candidates provided satisfactory answers, however the marks tailed off for parts (iv) and (v).

Q3

(i)

In regards to this question analysts will be covering the third PRI principle, namely 'we will seek appropriate disclosure on ESG issues by the entities in which we invest' [½]
Do the companies have any social or environmental objectives [½]
Are the objectives measured if so [½]
How is ESG communicated/implemented within the company [½]
What are the results [½]
And are they reported [½]
Is the company's ESG rated by an external agency [½]
If so what is the rating [½]
Analysts should ensure that the companies are properly run [½]
With proper reporting lines, and board structure [½]
Are the accounts audited correctly [½]
That shareholders are allowed to vote [½]
A policy on diversity both at board level and below [½]
That the companies do not engage in criminal activity [½]
And that executive remuneration is set at the appropriate level [½]
and properly determined [½]
Do the companies treat staff appropriately, both in terms of pay and conditions [½]
Do the companies have good employee/employer relations [½]
Do the companies provide a safe working environment [½]
Do the companies source materials in an appropriate manner [½]
Do the companies handle and safeguard data correctly [½]
Do the companies dispose of waste in an appropriate manner [½]
Does the company work to minimise the pollution produced by its own vehicles and those of its suppliers [½]
Other valid ESG questions can be given credit

[Marks available 11½, maximum 4]

 © Institute and Faculty of Actuaries

(ii)
Real estate companies will construct and own property; they often sub contract the construction and therefore only have a small number of staff who are directly employed [½]
Their customers are those people who buy or lease the buildings they build [½]
The real estate analyst should also ask about what checks the real estate companies do on their sub-contractors [1]
Do they adopt safe practices both in terms of their own staff and those in the vicinity of the construction [½]
Is local pollution kept to a minimum during construction e.g. noise & dust [½]
Is all demolition/construction waste either recycled or disposed of in an appropriate manner [½]
Does the sub-contractor use the correct materials and construction techniques to ensure the buildings are constructed to the appropriate standards [½]
Are the staff employed by the sub-contractor suitably qualified for the jobs they are doing [½]
Are the buildings designed so as to avoid waste of energy [½]
both in the construction period [½]
and when they are in use e.g. solar panels [½]
Once completed do the buildings comply with local & national regulations e.g. sprinklers for fire prevention [½]
Are the properties properly maintained to ensure the safety of both their customers and staff [½]

[Marks available 7, maximum 4]

(iii)
This is applying principle 2 i.e. 'We will be active owners and incorporate ESG issues into our ownership policies and practices' [½]
The approach the investment company adopts will depend on the issues that emerged [½]
If it were serious reports may need to be made to the relevant regulatory body [½]
It can be pointed out that companies with a good ESG profile are more attractive to investors and are likely to command higher ratings [½]
It will also depend on the size of the holding in the company [½]
If the investment company has a large stake they are obviously in a much stronger position to drive through the appropriate action [½]
If the holding is relatively small then there may be a limited amount that can be achieved, however it can be pointed out that other investment companies are likely to reach similar conclusions [½]
Assuming the issue didn't involve criminal activity then [½]
The first thing would be to have a conversation with the management to ascertain if there is a reason for the issue. E.g. it may be impossible for management to do anything about the issue [½]
If it is something relatively minor then the analyst could seek assurances that it will be rectified and check at a later date that the necessary action has been taken. [½]
For major issues the analyst could speak to the management and point out the issue and determine if they will rectify the issue and establish a timescale for them to comply [½]

 © Institute and Faculty of Actuaries

The analyst could also say that if the issue isn't resolved the investment company would be forced to sell its holding in the company [½]
Or vote against directors being reappointed at the AGM [½]
This may highlight the issue to other investors and/or create some publicity which the company may be unhappy about [½]
Encourage the companies' remuneration committees to link directors' remuneration to addressing PRI issues [½]
Engage with other shareholders and stakeholders to increase the pressure on the companies' management teams to address the PRI issues [½]
In the event that management won't change then the investment company has the option to sell its holding and invest in companies that do comply with its code [½]

[Marks available 8½, maximum 4]

[Total 12]

This question produced the widest range of marks; some candidates did very well while others did relatively poorly. Overall part (i) was answered the best with the other two parts producing much greater variability. Where candidates failed to score well in part (i) it looked like they hadn't read the question and answered a different question. A common misconception in part (ii) was that real estate companies built or invested in housing with commercial real estate being ignored. Relatively speaking this question produced the lowest marks.

Q4

(i)(a)

$P_0 = S_0 e^{jc}$. [1]

(b)

It is highly likely that there will be transaction costs and [½]
It is unlikely that there will be access to unlimited borrowing at the risk free rate [½]
There are also likely to be arbitrage opportunities [½]
Assumes storage costs of underlying asset are zero [½]
There may be taxes payable, however it is possible that there won't be any tax [½]
There is no restriction on short selling [½]
This depends on a number of factors e.g, the country, the type of investor, tax losses brought forward etc [½]
The formula in part (i) applies to non-income producing assets [½]
Assets are fully divisible [½]
And there is no default [½]

[Marks available 6, maximum 3]

(ii)

At time 0, the investor could first sell the asset short [1]
at the spot price S0 [½]
Invest the proceeds at the risk-free rate [½]
To accumulate the sum S0 ejc at time T [½]

 © Institute and Faculty of Actuaries

At time 0 the investor could also enter into a long forward contract [1]
to buy the asset at time T for the forward price, P0 [½]
At time T, the investor's profit uses the accumulated sum to buy the asset [½]
[Marks available 4 ½, maximum 4]

(iii)

$S_0\ e^{jc} - P_0$ or [1]
$S_0\ (1+i)^T - P_0$ [1]
[Marks available 2, maximum 1]

(iv)
No hedging is required for purchases on 1 July 2021

	Year 1	Year 2	Year 3
Time	1	2	3
Fuel to be purchased (metric tonnes)	2,000,000	2,200,000	2,400,000
Fuel to be hedged	1,500,000	1,650,000	1,800,000
No of contracts required	1,500	1,650	1,800

i.e.: 1,500 contracts for delivery in 1 years' time (on 1 July 2022)
1,650 contracts for delivery in 2 years' time (on 1 October 2023)
1,800 contracts for delivery in 3 years' time (on 1 October 2024)

The question doesn't give the number of tonnes per contract, if a candidate has done the correct calculation for the amount of fuel to be hedged then they should receive full marks.

(v)

Risk free rate		1.2	1.3	1.5
Spot Price	600	610	580	650
e^{rt}		1.012072289	1.026340948	1.04602786
Forward Price per Tonne		607.2433733	615.8045691	627.616716
Profit/Loss per tonne		2.76	-35.80	22.38
Total Profit		4,134,940	-59,077,539	40,289,911

Therefore the total profit is -$14,652,688 i.e a loss.

[3]

 © Institute and Faculty of Actuaries

(vi)
At the time the hedging is initiated, the future spot prices are not known [½]
Profits or losses on hedging contracts are variable, but they offset increases or reductions in the fuel price [½]
So the airline will not benefit from falls in the fuel price or suffer the effects of an increase [½]
Hence hedging increases certainty of the price paid, so reduces financial risk for the airline [½]
Only 75% of the fuel costs are hedged [½]
The hedging only covers the next three years, beyond that horizon there is no protection [½]
Perfect hedging not possible because exact fuel requirements are not known [½]
There will be additional transaction and management costs associated with the hedging [½]
A sudden collapse in demand for flights may mean the airline has too great an exposure to the fuel market [½]
The strategy would be easy to implement [½]
There is a default risk [½]
However this may be reduced by collateralisation [½]
[Marks available 6, maximum 3]
[Total 17]

This question was the best answered on the paper. The question didn't state the contract size in part (iv) and full marks were given for calculating the volume of fuel that needed to be hedged. As a consequence, this was one of the best answered parts of the paper.

Q5
(i)
The trustees could decide to permanently reduce their full allocation (or a proportion of their allocation) to equities [1]
By reducing their allocation to equities this would protect their fund value from the impact of a fall in equity values [½]
The trustees could invest in more defensive equities, those with a lower correlation to the market [½]
Alternatively trustees could decide to use derivatives to temporarily reduce or limit their exposure to equities [1]
The trustees could use swaps [½]
e,g. take out a total return swap whereby they swap the returns on their portfolio for the returns on another asset [½]
The scheme could enter into a volatility swap [½]
where the trustees swap the future volatility of their portfolio for a fixed level of volatility [½]
This will apply to both upside and downside volatility [½]
The trustees could use futures [½]
e.g. sell index futures which would protect the portfolio or part of the portfolio from any market fall [½]

 © Institute and Faculty of Actuaries

This strategy is particularly attractive when the market is looking over-priced and vulnerable to a fall or 'market correction' [½]
Options could also be used [½]
e.g. they could enter a contract to buy equity put options on the equity portfolio value fixed at the exercise price of the options (i.e. portfolio insurance) [½]
Using options has the benefit of preserving any upside should the markets move up rather than down [½]
The trustees could use a straddle option strategy [½]
Whereby a put & call are purchased with identical strike prices and expiry dates. One side of this strategy will produce a profit if the price moves, though the premiums paid need to be taken into account [½]

[Marks available 9½, maximum 5]

(ii)
<u>Issues with temporarily or permanently reducing the allocation:</u>
this approach would also mean they miss out on any future potential upside from equity markets [½]
and they would incur costs in realising the value of the equities [½]
There may be a tax charge [½]
The sale may move the market [½]
Increase the governance time spent implementing the sale of equities and decision-making process of where to direct the proceeds from the equity sales [½]

<u>Issues with using derivative instruments</u>
This is reliant on the ability of the pension scheme to delegate to an investment manager quickly and efficiently [½]
For the trustees to agree to this strategy, trustee training may be required which could delay the implementation [½]
OTCs such as swaps may be costly to set up [½]
Or to close [½]
Also it may not be possible to find a counterparty [½]
There may be time taken to implement the strategy in order to prepare the necessary paperwork and manager instruction as well as trustee signatures [½]
If the value of the scheme's equity portfolio increases, the potential 'profit' is eroded by the cost of the option premium paid upon entering the contract [½]
The use of equity derivatives will not remove all the equity risk faced by the scheme [½]
The trustees face basis risk…where the price of a future or option follows the cash price very closely, the basis may not move exactly as expected [½]
The trustees also face cross hedging risk……whereby unless the trustees equity portfolio to be hedged behaves the same as the underlying index, the hedge will not be perfect [½]
There may also be counterparty risk [½]
There is also the possibility of margin calls [½]
Depending on the time horizon, there may be a rollover risk [½]
These risks could be amplified if the equity portfolio covers a number of equity indices, or factor based weighted indices, which are less liquid than indices weighted by market capitalisation [½]

 © Institute and Faculty of Actuaries

The trustees will also face frictional costs dealing in derivatives (e.g. broker commissions, dealing spreads etc.) [½]
The trustees will also need to consider whether the currency exposure is to be hedged within the option strategy [½]
[Marks available 10½, maximum 4]

(iii)
In general, the trustees will have to consider what elements they are most worried about
What is meant by a fall [½]
the level of equity volatility they expect (i.e. substantial fall in value or lower levels of volatility) [½]
whether they are willing to bear a portion of that downside protection; and [½]
what level of equity return would they prefer to retain (which will be linked to their underlying equity return assumptions incorporated into their strategy) [½]
The risk appetite of the scheme will also be important [½]
And the timescale, the question doesn't state how long the protection will last [½]
As all the strategies have an initial cost of zero the more downside protection provided the less upside potential is retained [½]
This may be dependent on the funding position of the scheme [½]
And its maturity [½]
The other assets within the scheme should also be considered [½]
and the correlation they have with equity markets [½]
There may also be tax considerations [½]
Or regulatory issues [½]
And trustees may need further training before reaching a decision [½]

<u>Option 1</u>
This limits the downside to 10% [½]
and is the only strategy that covers falls of more than 25% [½]
and retains more upside potential than B and less than C [½]
If the scheme could stand a 10% fall in the value of its equities this strategy might represent a good choice as a reasonable amount of upside is retained [½]

<u>Option 2</u>
Provides full protection for the first 25% of equity market falls but the Scheme is then exposed to further falls greater than this [½]
The attraction to the trustees is that equity markets would have to fall by more than 25% before they see any loss on their portfolio [½]
A fall of more than 25% is highly unlikely [½]
However if it did happen then it is possible that markets could fall a lot lower at which point there may be contagion into other assets [½]
But the trustees must give up the most upside return as a result [½]

<u>Option 3</u>
Retains a greater amount of equity return upside relative to options 1 and 2 [½]
but requires the trustees to bear the first 5% of equity fall before the protection kicks in for the next 20% of equity market fall [½]

 © Institute and Faculty of Actuaries

If equity markets only fall a little, then again, no protection is provided [½]
In retaining the greatest equity return upside the trustees achieve the least protection in terms of the amount of a market fall [½]
The choice the trustees make will also be dependent on how likely they feel a fall will be [1]
This will dependent on many factors e.g. valuation and recent history [½]
[Marks available 15, maximum 9]
[Total 18]

This question produced a range of answers. On the whole the question was answered well with good marks being scored on parts (i) and (ii) and reasonable marks on part (iii).

Q6
(i)
The assumptions underlying the ALM will need to be modified [½]
In particular the assumed inflation rate [1]
Particularly how the new rate of inflation compares to that previously used [½]
And any caps on inflation that are currently assumed [½]
The liability cash flows will need to be updated to incorporate the change in inflation assumption [1]
The nature of the liabilities may have changed [½]
e.g. what were fixed liabilities are now real [½]
The degree to which the model will need to be modified will depend on how the new inflation rate compares to what was used in the past [½]
If the change is significant it may have major implications for other parts of the liability calculation. [½]
The change in the inflation assumption may mean that the asset mix has to change [1]
As a different return may be required [½]
Which may result in the risk profile changing [½]
The costs associated with managing the assets may have changed if a different return is being targeted [½]
The ALM assumptions on some other asset classes may also be affected by the proposed change in inflation and need to be incorporated into the model [½]
Especially what returns these assets can be expected to generate going forward [½]
The result may mean that the trustees may need to modify the key objectives of the scheme [1]
The trustees may have to reduce their target of 70% chance of success [½]
And/or the ten year time horizon [½]
They may also need to remove/alter some restrictions currently in place [½]
The employer will need to be consulted especially if their contribution is going to change [½]
[Marks available 12, maximum 7]

 © Institute and Faculty of Actuaries

(ii)

General - points

None of these strategies meet the previously agreed targets [1]
Trustees will need to discuss the situation with the sponsoring employer and determine their attitude to any changes . [1]
The regulator may also need to be consulted when the timeline is being increased [1]

Strategy A

requires an increase in investment risk to achieve the funding target within the same timeframe agreed by the trustees [½]
However there is a lower chance that this will be achieved (60% vs the previous 70%) [½]
This would likely increase the trustees 'funnel of doubt' in order to retain the same time horizon and target [½]
The trustees would need to be comfortable with the additional level of risk they are taking within the investment strategy [½]
and be willing to accept a lower probability of reaching their target [½]

Strategy B

extends the Schemes timeframe to reach the originally agreed funding target by 5 years [½]
However there is no change in the amount of risk being taken [½]
It also becomes more likely that the funding target is achieved in the new time frame [½]

Strategy C

enables the Scheme's to reach its original target by taking lower investment risk [½]
however the timeframe has doubled [½]
which places additional risk on any company support [½]
It might be difficult for the trustees to agree on this option [½]

Strategy D

achieves a good balance between avoiding taking additional investment risk [1]
retains a similar threshold of chance of success [½]
and only marginally increases the timeframe to reaching the funding target [½]

If a candidate indicates which is the preferred strategy and gives a good reason for doing so then a full extra mark can be awarded i.e. 1 not ½.

[Marks available 11, maximum 6]

(iii)

Using the VaR measure provides a statistical measure of the downside risk [½]
by assessing the potential losses on the portfolio over a given future time period with a given degree of confidence [½]
Further clarity would be sought as to whether the measure used is on an absolute or relative basis to the Scheme deficit [½]
The statistical distribution of returns assumed when calculating the measure should be clarified [½]
because it is based on assumptions which may not reflect what happens in practice [½]
i.e. whether a normal distribution is used or a non-normal ('fat tailed' or 'skewed') is used which could display misleading risk figures [½]

 © Institute and Faculty of Actuaries

Further clarity on the investment strategy C in the underlying portfolio is required [½]
because strategy C shows a reduction in risk [½]
but if this risk reduction has been achieved using derivative exposure [½]
or an increase in credit risk (via debt related assets) the risk exposure may not be captured properly if a normal distribution is used [½]
Investigate whether a skewed or fat tailed distribution has been used and which one (Gumbel, Frechet or Weibul) [½]
The future time period used in the VaR calculation should be considered to see whether it remains appropriate [½]
or clarify if monte carlo simulations have been carried out [½]
The much longer time period means there is a much greater chance of an extreme market event [½]
It would be useful to know if any stress testing was undertaken [½]
Looking at portfolio covariances and correlations which may indicate that the actual risk is higher than thought [½]
Look at sensitivity testing using different levels of inflation [½]
However, this would not provide error proof answers where further allowance of the tail of the distribution reduces the validity of the analysis and therefore [½]
An alternative risk measurement approach should be investigated/probed/suggested [½]
[Marks available 9½, maximum 6]
[Total 19]

Like question 5, candidates benefitted from the fact that there were a substantial number of marks available which meant they didn't need to make every point to get good marks. Generally candidates scored well on part (ii) in particular.

Q7
(i)
The risk manager will be interested in the following:
The ability of the specialist company to perform all the functions required of the back office [1]
This will include doing everything in a timely manner [½]
Will the offshore company be operating in a different time zone, if so will this have an impact [½]
Will communications between the front and back office be secure [½]
And reliable [½]
Will they speak the same language [½]
Will there be a cultural clash [½]
Will the records etc. be secure [½]
What happens in the event of a natural disaster [½]
Is there a disaster recovery centre [½]
Will the offshore company adhere to the data protection laws applicable in both the country of origin and the country where the offshore company is based [½]
If they are providing custody, will the documents be safe [½]

 © Institute and Faculty of Actuaries

Is there any political risk [½]
Either internally or externally –e.g. a revolution and/or international sanctions [½]
Will the legal system under which the offshore company works provide adequate protection in the event of any criminal or civil action [½]
Are the staff suitably qualified and trained [½]
Will any of the experienced back office staff be retained [½]
Are there certain key people on whom the offshore company rely [½]
Reputational risk if something goes wrong [½]
Or if the offshore company is not treating its employees appropriately [½]
Is the offshore manager financially stable [½]
And audited by a reputable firm of accountants [½]
Are there robust checks to prevent fraud or theft [½]
What is the process for dealing with issues, should they arise [½]
Does the offshore company offer this service to other fund managers, if so what has their experience been like [½]
Will the offshore company treat all their clients equally [½]
In the case of an error will the offshore company be able to compensate the injured parties either from their own resources or from their insurers [½]
How will the transfer of operations take place [½]
Will the computer systems be compatible [½]
Who will be the person responsible at the offshore company for supervising the back office of the fund manager [½]

[Marks available 15½, maximum 5]

(ii)
The risk manager would need to visit the site the offshore company is going to use to run the back office [1]
They would need to produce a register of risks listing the risks and how they could mitigate these risks [1]
The political situation would need to be carefully analysed [½]
As well as the legal system [½]
And meet the staff who are going to be running the back office [½]
They will need to ensure that the centre has adequate properly trained staff and has the ability to hire more should any staff leave [½]
They will need to ensure that staff that interface with the fund management group are fluent in the appropriate language [½]
And that the offices will be manned at the appropriate times which would be determined by the fund management group [½]
They will need to ensure that there is a secure reliable communication channel e.g. a VPN and that there is a backup in case the main channel fails [½]
The financial records of the offshore company should be analysed [½]
The financial forecasts should be stress tested to determine what would happen in various scenarios [½]
The analysis should include checking on the insurance that is in place [½]
Determine what would happen if any key personnel were to leave or become incapacitated [½]

 © Institute and Faculty of Actuaries

The risk manager could ensure a 'whistle blowing' policy is in place and correctly administered [½]
They will also need to ensure that in the event of a catastrophe there are backups and there is disaster recovery plan [1]
Similarly they will need to ensure that there are backup power units [½]
They will need to check on the insurance that the offshore company carries [½]
The compatibility of the computer systems will need to be tested [½]
The risk manager may want a period of parallel running so that any bugs can be sorted out without impacting on front office operations [½]

In the event of the candidate producing a valid risk that the risk manager may be concerned about and/or a possible action ½ may be given

[Marks available 11, maximum 5]

[Total 10]

Again candidates could score highly given the number of marks available and overall the marks were good with part (i) producing relatively better answers than part (ii).

[Paper Total 100]

END OF EXAMINERS' REPORT

© Institute and Faculty of Actuaries