INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

September 2018

Subject CA1 – Actuarial Risk Management

Paper Two

Introduction

The Examiners' Report is written by the Principal Examiner with the aim of helping candidates, both those who are sitting the examination for the first time and using past papers as a revision aid and also those who have previously failed the subject.

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

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

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

Mike Hammer
Chair of the Board of Examiners
December 2018

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

1. The aim of the Actuarial Risk Management subject is that upon successful completion, the candidate should understand strategic concepts in the management of the business activities of financial institutions and programmes, including the processes for management of the various types of risk faced, and be able to analyse the issues and formulate, justify and present plausible and appropriate solutions to business problems.

2. This subject examines applications in practical situations of the core actuarial techniques and concepts. To perform well in this subject requires good general business awareness and the ability to use common sense in the situations posed, as much as learning the content of the core reading. The candidates who perform best learn, understand and apply the principles rather than memorising the core reading.

3. The examiners set questions that look for candidates to apply the principles specific to the situation set out in the questions, having read the question carefully. Many candidates gain few marks by writing around the subject matter of the question in a more general fashion. Detailed specialist knowledge is not required and nor is very detailed development of particular points.

4. Good candidates demonstrate that they have used the planning time well to understand the breadth of the question and to structure their answer – this is a big advantage in making points clearly and without repetition. This also enables candidates to use the later parts of questions to generate ideas for answers to the earlier parts.

5. Time management is important so that candidates give answers to all questions that are roughly proportionate to the number of marks available.

6. The comments that follow the questions concentrate on areas where candidates could have improved their performance. Candidates approaching the subject for the first time are advised to use these points to aid their revision.

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

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

- The standard of the answers to Paper 2 was similar to other sessions .Better candidates planned out their answers, particularly for the longer questions and were rewarded because there was less duplication in their answers and ensured they thought widely enough to score well.
- As per previous sessions answers to the application questions were mixed in that those that were structured scored well, whereas those that weren't had problems getting sufficient depth into their answer.
- It was clear that the well thought out answers had planned them better, this is a good use of reading time.
- In this diet the scoring for the exam was done out of 200 and therefore the mark scheme shows a total of 200 marks available for the paper.

C. Pass Mark

The Pass Mark for this exam was 59.

Solutions

Q1

(i) Reputation of Buyco [1]
private/public [1]
know your client requirements [1]
The actuary will want to ensure that it is working to ensure their reputation isn't damaged by taking on the appointment. [1]

Is the actuary competent to provide advice in this area? [1]
Or has support who is? [1]

Is full information available to be able to do a thorough job? [2]

Does the actuary have support [1]
such as peer review process? [1]

Professional standards [1]
E.g. TAS, actuaries' code [1]

Ensure sufficient time available to do a competent job [1]

Able to take personal responsibility for the work. [1]

Ensure all stakeholders' interests are considered [1]

Any conflicts of interest? [1]
e.g. in relation to target company? [1]

Need to consider the timeliness of completing the task (i.e. is there sufficient time) and if there is not enough time then need to consider whether the quality is to be compromised [2]

Need to consider how the results will be communicated [1]

Any other reasonable conflict of interest example [1]
[Marks available 21, maximum 10]

(ii) So that the actuary ascertain if she can take on the work both legally [1]
and professionally. [1]
Linked to this the actuary should ensure that they can do a good job [1]
Within the agreed timeframes of the client. [1]

If the actuary did not have the level of support required then the quality may be compromised [1]

Bearing in mind the requirement to behave in line with the Actuaries' code [1] and other regulation [1]

Protect the reputation of the Profession [1]
Such has having the required skills and agreeing the scope of any agreed work [1]

Company's reputation – is it "doing the right thing"? [1]

[Marks available 10, maximum 6]
[Total marks available 31, maximum 16]

(i) Was generally well answered with most candidates scoring well
(ii) Was less well answered with few candidates scoring well on an easy application question.

Q2

(i) Staff retention (lose good staff and expertise) [1]

The staff may have further to travel to get to the new office and therefore decide to leave the company. [1]

This might become even more pronounced if there are rival companies close to the old offices. [1]

New office not ready in time / over budget [1]

This would be an issue if the old offices are closed down immediately and occupation could not be extended. [1]

Catastrophe destroys new building [1]

This is a risk with all buildings but currently there are two sites so not as exposed. [1]

Fortunes of new company worse than expected [1]

Higher than expected costs of new property [1]

The building costs may be higher than expected leading to losses as per above (fortunes worse than expected) [1]

Transport links may not be as good as expected leading to travel times and employees productivity being lower than currently expected [1]

Government may impose higher "business rates" in a particular area [1]

Systems or equipment failure on move – cyber risk. [1]

Risk of interruption to the business as a result of the move [1]

Any reasonable example [1]

Note to markers – please give credit for distinct examples

[Marks available 15, maximum 6]

(ii) Staff retention

- Payments to key staff to encourage them to stay "retention bonus" [2]

- Opportunity for redundancy exercise to remove excess staff post-merger [1]

- Offer relocation packages to key staff [2]
- Subsidise the travel costs [2]

- Review the packages to ensure better than competitors JC1

Office block not ready in time / behind budget
- Monitoring / project management to ensure progress is continually made in the building of the new office [2]

- Consider contingencies in budget and timescales [1]

- Penalties for slower progress than expected by the builders/contractors [2]

Catastrophe
- Insurance [2]

- Disaster recovery plan [1]

  e.g. have option to rent space at short notice in another building, work from home[1]

Fortunes of new company
- Negotiate smaller part of new block [1]

- Rent out unused part of the office, creating more income MA1

Higher than expected property costs
- Government subsidy if available? [1]

- Negotiate fixed price deal with property developer [1]

Transport links worse than normal
- Offer flexible working hours to avoid "rush hour" [2]

- Offer technology so working can be done at other sites/home/train [2]

System Risks
- Thorough testing in advance [1]
- Phase the movement [1]

Business interruption/equipment failure
- Phase the move [1]
- Simultaneous working across old and new sites [1]

[Marks available 29, maximum 10]

[Total available 44 max 16]

(i) Most candidates scored well, with the better candidates thinking widely to score full marks

(ii) Answered less well, examiners were surprised that a range of mitigation options for each of the risks were not considered with most candidates focusing on one or two possible options.

Q3

(i) Information needed relating to the XYZ pension scheme.
Eg accounts, actuarial reports [1]

This will include the benefits payable [1]
and how they are calculated. [1]

Salary used to calculate benefits. Career average, final salary? [1]

Normal retirement age, options for early retirement. [1]

Ill-health retirement terms, death benefits and early leaver benefits. [1]

Increases to pensions – any guarantees? [1]

Any additional benefits e.g. pension to spouse. [1]

Any guarantees or options available. [1]

Expected mortality relating to XYZ scheme if known. [1]

Information needed in respect of members entitled to receive benefits. [1]

Will need information relating to age, sex, marital status, length of past service, salary (current and historic if needed), type of work. [4]

Asset value [1]
Asset allocation [1]
E.g. equity/bond split [1]
Valuation methodology for assets [1]

[Marks available 19, maximum 8]

(ii) **Relating to the membership**

Check that data is complete i.e. all members accounted for. [1]
And reconciled against previous data [1]

Check that the benefits have been recorded correctly. [1]

Check for any unusual values [1]
E.g. relating to dates of birth, [1]
Or start date given age, salaries. [1]

Random spot checks on data for individual members. [1]

Check against other sources (HR Records) PA1

Relating to assets

Check that the assets still exist. [1]

Check that the assets are still owned by the scheme. [1]

Check that data is complete i.e. no missing assets. [1]

Check that only appropriate assets have been included. [1]

Check that the market value of each asset has been recorded correctly. [1]

Check that values of any assets with no market value are appropriate. [1]

General points

Will need to check the details relating to the pension scheme. [1]
Will need to know the promises made by scheme or employer [1]
and any other expectations relating to the scheme. [1]
Any other points raised by the scheme rules [1]

[Marks available 18, maximum 8]

(iii) Need details of the XYZ scheme. [1]

Are the benefits provided similar to those provided by ABC? [1]
If not, merging the two schemes may be particularly complex [1]
and give rise to many problems. [1]

The membership profile of XYZ. [1]
Is this similar to ABC? [1]

What alternatives are there to the merger? [1]

Will it be difficult to have ABC members in DB scheme but not XYZ members? [1]
Need to consider expectations of XYZ employees. [1]
Fairness to members of both schemes [1]

Will there be pressure from any employee associations or trade unions? [1]
Consultation with members [1]

What level of contributions do the members of XYZ scheme pay? Is it similar to ABC? [2]
Will any increases be acceptable? [1]

Need to consider the sustainability of both DB schemes. [1]
This may be a good time to review the ABC scheme. [1]
Lack of changes could imply continuity which may not be practical in long term [1]

How well funded is the XYZ scheme [1]
In absolute terms and also relative to the ABC scheme? [2]

Potential costs of merging the two schemes. [1]
Either advisory or transactional [1]

But also savings to consider e.g. one actuary/administrator etc. [1]

Regulations relating to both schemes or any necessary approvals [1]

Impact on financial strength of ABC [1]

Administration issues [1]

How do the investment strategies compare? [1]

[Marks available 28, maximum 10]
[Total marks available 65, maximum 26]

(i) Well answered by most candidates, with well thought out range of answers.
(ii) Less well answered with few candidates thinking widely enough to score well on the question,
(iii) Similar to (ii) in that those candidates that thought widely around the topic scored well, with others focusing on one or two of the points.

Q4

(i) Control costs for the following reasons:

- Longevity risk i.e. payable for longer than expected. [1]
- Particularly in developing country, may expect life expectancy to improve over time [1]
- Inflation risk i.e. higher amount than expected. [1]
- High price inflation could be a problem in a developing country [1]
- Also salary inflation could be high as well [1]
- In developing country [1]

- Believes it is already too generous [1]
- Pay As You Go – no funding at the start [1]
- To reduce fiscal deficit [1]
- This may have worsened due to an economic downturn. [1]
- Want to reduce future government debt [1]
- Avoids other unpopular measures eg tax increases [1]
- Or cutting other benefits [1]
- Can't afford to increase borrowing due to rating downgrade [1]
- As society gets older, working population that can pay tax to fund pensions falls [1]
- Influenced by adverse experience of other countries [1]
- Political pressure e.g. international pressure from IMF [1]
- Intergenerational fairness [1]
- To stimulate emerging private provision given country is developing [1]

[Marks available 19, maximum 8]

(i) A - Contributions

- Money available in advance [1]
- Possibility to earn investment returns [1]
- But need to decide how to invest [1]
- or whether contributions get used in other government spending [1]
- Increased awareness for citizens to provide for their own retirement needs, boosting other pensions provisions [1]
- High costs – up-front implementation and ongoing administration to collect and track contributions [2]
- Unpopular for those who haven't paid before [2]
- And potentially cannot benefit if over 60 [1]
- Could reduce citizens' disposable income significantly [1]
- negatively impacting economic growth now [1]
- Many citizens will only opt to contribute for 5 years only and the Government won't be able to achieve its targeted funding [1]
- Unfair to poor citizens or those who can't work [1]

B Increase pension age

- Reduces longevity risk [1]
- Reduction depends on current and future life expectancy [1]
- Could only have marginal impact as only one year [1]

- Fairness e.g. between different generations of citizens [1]
- Adversely impact poorest in society with lowest life expectancy [1]
- Unpopular for those who had expected to retire at 65 [1]
- Possible cliff-edge for those just coming up to 65 [1]
- Other state benefits (or private provision) may have to be paid for longer [1]

C Remove increases

- Removes inflation risk [1]
- so costs fall in real terms [1]
- Over time, pension will become lower in real terms [1]
- so pensioners' standards of living may fall [1]
- Pensioners won't share full proceeds from economic growth [1]
- Yet are still paying for past increases into the future [1]
- Assuming price inflation increases every year, real value of the pension will be smallest in the final years when the citizen will need the income the most due to deteriorating health and need for care [2]
- Simplifies administration [1]

[Marks available 32, maximum 12]

(ii) (a) Implementation

- Increase for all citizens from a certain date [1]
    - o What about people who just turn 65, do they lose out? [1]
    - o Set appropriate transitional arrangements [1]
    - o Set date far enough in the future so that people can plan ahead [1]
    - o Stagger the increase over time e.g. increase over a 5 year time period [1]
- Only increase for citizens below a certain age e.g. age 45 now [1]
- Only apply the increase to certain sections of the population [1]
- e.g. by industry, region, pre-retirement income [1]

(b) Practical issues

- The administration infrastructure may not be adequate to cope with a new change [1]
- Particularly as a developing country [1]
- Expense of upgrading that infrastructure [1]
- Need to track who is eligible [1]
- How to treat emigrants do they still get benefits? [1]
- Consider best ways to publicise the changes [1]
- And ensure individuals have the necessary information [1]
- Difficulty in choosing implementation date – too far ahead and Government will not reap any benefits [1]
- But too soon and citizens don't have time to plan [1]

- Consider costs of administering [1]
- Politically can they implement [1]

[Marks available 19, maximum 10]

[Total marks available 70, maximum 30]

(i)	*Answered less well than other questions with only the better candidates thinking widely enough to score easy marks that were available.*
(ii)	*Those candidates that broke this down into each of the 3 areas scored well, with those that focused too much on one area scoring less well.*
(iii)	*Answered less well, with few candidates thinking widely enough to score well on this part*

Q5

(i) For a new policy insurance company will get information for all current underwriting factors used for determining premiums [2]
All information received will be up to date [1]
For a new policy the insurer has greater freedom to refuse to quote [1]
reject cover [1]
or apply special conditions to cover [1]

For renewals insurance company will only have information previously collected to use in the underwriting [2]
From a conduct perspective there is reduced freedom to refuse to quote [1]
reject cover [1]
or apply special conditions to cover [1]

Insurance company may not have information for all factors used for new business [1]
The longer the period since the policy was originally taken out the more missing information on current underwriting factors [2]
Differences in underwriting factors for new and existing business provides anti-selection opportunity [2]
i.e. a policyholder can test if a new quote provides a higher or lower premium before renewing [1]
The potential for anti-selection increases with the period since the policy was originally taken out [2]
The potential for under-insurance increases [1]
Sum assureds may be indexed to reduce this risk [1]

Claims underwriting likely to include greater discretion/materiality if underwriting information is out of date rather than refuse claim. [2]
This is in particular if the contract automatically renews. [1]
A key issue is how aware policyholder is that the information is out of date. [1]

The number of policies, say 10 years since originally underwritten will be lower than recent business so has lower credibility [2]
The underwriting data on older policies will be more out of date so less credible [1]
Renewals can be quicker and cheaper [2]
As already hold some verified data [1]
And have other data over life of policy such as claims or telematics [2]
New rating factors can be applied on renewals [2]

[Marks available 35, maximum 14]

(ii) a) Level of Cover

To reduce risk of underinsurance the sum insured can be indexed [2]
An appropriate inflation index should be used [1]
Apply exclusions / special item cover limits [2]

Do not allow increased cover without underwriting [1]

b) Underwriting

Use publically available data to identify potential out of date underwriting information [2]

e.g. credit rating agencies, electoral role, building control records [1]

Higher contingency margins for lower credibility of experience data from older contracts [2]

Higher contingency margins for to allow for out of date premium underwriting information [1]

Does this then impact on competitiveness? [1]

Premiums to allow for differences in claims underwriting strictness for older contracts [2]

c) Risk management

Risk management process altered for older contracts [1]

to avoid complaints or bad publicity for refusing or reducing claims[1]

Request underwriting at claims stage [1]

To avoid complaints/bad publicity for refused claims [1]

And can also use for future renewals [1]

Don't gtee reviewable rates [2]

Require further disclosure on renewal [1]

Utilise information that they do have – e.g. postcode impacts [1]

Insurance company can introduce new products to encourage policyholders to contact insurance company to up to date underwriting data [2]

[Marks available 27, Max 14]

(iii) To adjust for experience against assumptions [2]

in line with the actuarial control cycle [1]

The company will want to understand the experience it has had versus assumptions [1]

Then if they have been making losses then they can increase the premium accordingly [1]

The company will also want to look at the experience in particular areas and reflect the pricing in these areas or adjust business mix [1]

EG if they have been making losses in a particular area and this is due to crime they will want to reflect this in the premiums or pull out completely [1]

React to market pressures [1]

And anticipated future changes in the commercial environment [1]

Changing level of competition (up or down) may impact market share [1]
or profit [1]

Update for new information and technology [1]

Technology may have made it cheaper to underwrite and therefore expenses could be adjusted leading to reduced premiums [1]

The government may have changed their policies OR created subsidies in some areas [1]

That may not be reflected in the premiums [1]

To optimise revenue and profitability [2]

Or adjust to revised business requirements eg profit target [1]

Short term business so can review each year [1]

[Marks available 19, max 10]

[Total marks available 80, max 38]

This question was answered poorly by most candidates with few grasping the points that were required. Those candidates that thought about it from the perspective of what information the insurer may or may not have at renewal stage tended to score better on all parts of the question with those that just focusing on a generic answer scoring less well.

Q6

(i) Circumstances

- Employer insolvency [1]
- Sponsor decides to stop financing benefit provision [1]
- As it's unaffordable [1]
- Sponsor sets up another benefit scheme [1]
- Scheme merger/demerger [1]
- State/regulator intervention [1]

[marks available 6, maximum 4]

- Continuation of the scheme without any further accrual of benefits [1]
- Transfer of the liabilities to another scheme with the same sponsor [1]
- Transfer of the funds to the beneficiary to extinguish the liability [1]
- Transfer of the funds to an insurance company to invest directly on behalf of member [1]
- Transfer liabilities to insurance company (eg annuities) [1]
- Transfer to central discontinuance fund [1]

[marks available 6, maximum 4]

(ii) Continuation with no accrual

- Level of benefits reduce (unless replicated in another scheme) [1]
- this may vary depending on the status of the member [1]
- May lose certain protections [1]
  - e.g. members with salary linkage for their benefits may lose this right [1]
  - Members benefits dates may change [1]
  - Members benefits may also be impacted if these are not in payment
- Possible to still get 100% of benefits accrued so far [1]

Transfer to another scheme

- Benefits may be unchanged [1]
- Benefits in new scheme may be different [1]
- Or new scheme better funded [1]
- Benefit structure may be different [1]
- e.g. lower pension increases in new scheme – this may mean that the member loses out [1]
- Or they may be able to accrue new benefits that better suit their circumstances [1]

Transfer to beneficiary

- Flexibility e.g. pay off debts, invest in higher-yielding assets [1]
- Lose valuable benefits that it may not consider e.g. life assurance [1]
- Member may not have expertise to manage benefits [1]
- Future income may fall [1]
- Tempted to spend it all! [1]
- May need advice [1]
- No longer concerned about sponsor covenant [1]

Transfer funds to insurer
- Costs of management [1]
- Insurer may have expertise in managing funds [1]

Transfer liabilities to insurer
- More secure provider [1]
- As expensive, may not get 100% of previous benefits [1]
- Loss of potential enhancements [1]
- May need to lock in "discretions" that could be expensive [1]

Transfer to central discontinuance fund
- May be a secure provider [1]
- Eg government backed [1]
- May not get full benefits depending on terms of the fund [1]

[marks available 28, maximum 10]

(iii)

- Member entitlements under the scheme [2]
  which may depend on the terms under which scheme operates [1]
- And overriding legislation/regulation [1]
- The expectations of the beneficiaries [2]
- which are likely to be the benefits that would have been available had the scheme not discontinued [2]
- What is market practice in these cases? [1]
- And the rules of the central fund [1]
- The funding level of the scheme [1]
- If fully funded there might not be any impact on the beneficiaries [1]
- What about expenses if no sponsor exists now [1]
- If poorly funded may need to change current or future benefits [2]
- If over funded how to distribute surplus? [2]
- Costs of running the scheme [1]

[marks available 18, maximum 8]

(iv)

- Strategy will depend on how the scheme is currently funded [1]
- and what assets are currently invested in. [1]
- And which discontinuance method used [1]
- If they are already matched and low risk then there may be no changes required at all [2]
- Move to less risky strategy [1]
  to better match benefits [2]
- Eg equities to bonds to better match cashflows [2]
- by nature [1]
- by term [1]
- eg using hedging instruments [1]
- to cover interest rate risk [1]
- to cover inflation risk [1]
- If fully funded, move to match existing benefits [2]

- Invest any surplus aggressively to generate extra benefits [1]
- Or refund surplus [1]
- Increased need for liquidity as scheme matures [2]
- Regulation may restrict investment strategy upon discontinuance [2]
- This could be in specific assets or other restrictions on exposure limits [2]
- Beneficiary may have to make decisions about the strategy [1]
- they may not be competent enough or will need advice [1]
- May move in to low cost run investments to minimise the impact on expenses [2]
- Eg may move to passive pooled funds [1]

[marks available 29, maximum 12]

[Total marks available 87, maximum 38]

(i) *Answered well with most candidates scoring nearly full marks*
(ii) *Answered well with most candidates scoring nearly full marks*
(iii) *This part was answered less well, but candidates that focused on each of the points in (ii) separately scored well*
(iv) *Most candidates managed to get half marks, with the better candidates thinking wider and therefore considering the scheme and the member.*
(v) *Answered reasonably well*

Q7

(i)

- to be able to quantify risks [1]
- and compare them [1]

- enable risk management/mitigation [2]
  - if issues are not measured they will not get managed [1]
  - avoid unexpected events [1]

- pricing [1]
- reserving/capital calc [1]
- investment [1]
  - trade off between risk and reward [1]
- capital allocation [1]
  - within companies [1]
  - between companies (ie allow capital providers to assess relative riskiness)
- set solvency standards/protect policyholders [1]
- EV/financial reporting [1]
- business strategy [1]
  - choice of markets [1]
  - choice of providers [1]
  - maximise profits [1]
- to comply with regulation [1]
- Reinsurance [1]

[21 available, Max 8]

(ii) VaR generalises the likelihood of loss by providing a statistical measure of downside risk [1]
It assesses the potential losses over a given future time period [1]
with a given confidence level. [1]

[Marks available 3, max 2]

(iii) The stochastic simulation results would produce, say, 1000 equally possible losses.[2]
Order the losses by size. [1]
Choose a confidence interval eg 99.5% [2]
And time period [1]
And for a confidence level is defined at the 99.5% level (say) then the 995th highest loss would give the VaR. [2]

[8 available, Max 4]

(iv) Useful in the sense that it is a simple/single statistic [1]

, but still contains some useful information to understand the risk. [1]

Simpler than looking at the full stochastic output, [2]

but as a single measure inevitably conceals some useful information. [1]

It quantifies the risk, which is a helpful focus for decision makers. [1]

Within the possible range of single statistics, VaR is particularly valuable [1]

as it is so widely adopted and understood across the financial industry. [1]

It's main drawback is that it is a single point estimate [1]

that tells you nothing about the rest of the distribution [1]

In particular, you normally want to understand the potential variability of bigger losses in the tail of the distribution of losses. [1]

And only covers a short period [1]

Would need VaRs at many points to understand long term risk [1]

It requires sufficient understanding by users to be effective [1]

and may be combined with other measures to increase its effectiveness [1]

eg measures of skewness of the loss distribution, or Tail VaR or simply VaR calculated at more than one percentile. [1]

Users of VaR need to be careful not to infer the behaviour of risk at other parts of the loss distribution. [2]

VaR's usefulness will also depend on the purpose of measuring loss and who wants to use the measure. [1]

Eg very useful to set solvency standards by a regulator who wants a single standard across all companies. [1]

Eg less useful if an actuary is assessing where to set the retention limit on a stop loss treaty to maximize after-reinsurance profits. [1]

(credit for other reasonable examples – one positive; one negative) *[1]*

VaR can be used for risk budgeting [1]

ie can measure and compare VaR for different risks/investments/lines of business. [1]

VaR is often in-built into financial software so can readily be calculated. [1]

Although this can also be a drawback as the underlying assumptions may not be readily apparent [1]

and there may be a lack of challenge as to their appropriateness, which can invalidate the resulting VaR. [1]

VaR results invalid if applied inappropriately [1]

Care is needed with VaR when combining risks not to simply add up the individual losses [1]

Diversification effects that mean the combined VaR is smaller than the total of the individual VaRs. [2]

Which means VaR does allow big picture ERM view [1]

Finally financial losses cannot be considered in isolation. [1]

A subjective assessment will also be needed to ascertain whether the risks being assessed: [1]

- Achieve synergy/compatibility with other projects, or diversification [1]
- satisfy any political constraints / other stakeholders [1]
- have sufficient upside potential [1]
- does the company have enough cash/capital in the first place [1]

[38 available, Max 12]

(v) VaR will be only as good as the choice of underlying distribution of losses. [2]

In particular, it is frequently calculated assuming a normal distribution of returns. [1]

If the distribution of returns is "fat tailed" or skewed, tracking error will result. [1]

Financial loss distributions will often be non-normal. [1]

However the further one gets out into the "tails" of the distributions, the more lacking the data and hence the more arbitrary the choice of the underlying probability becomes [1]

And very sensitive to inputs [1]

[7 available, max 4]

(vi)

Tail VaR gives information on the severity of failure [2]

whereas VaR gives no information on the losses in the tail. [2]

Both VaR and Tail VaR are calculated from the same distribution of possible loss outcomes. [1]

However, creating a distribution of loss outcomes involves some subjectivity, and often involves compromises, particularly around the tail of the distribution. [1]

To get an appropriate VaR it is possible to focus on the particular area of the distribution (percentile) so that the compromises can be minimised over this range. [1]

To get an appropriate Tail VaR is more challenging because it is necessary to have an appropriate distribution from the percentile for the Tail VaR onward throughout the extreme of the distribution. [1]

A tail VaR is therefore much more dependent on areas of the distribution where there can be more compromises and greater subjectivity. [1]

If the potential outcomes in the tail are very extreme then small changes to the tail can have a significant impact on the Tail VaR. [2]

So Tail VaR is more complex to calculate and can also be more difficult to explain. [1]

Due to the limitations inherent in Tail VaR, many people prefer the VaR measure. [1]
Though tail VaR is more prudent [1]

VaR used in legislation [1]

[marks available 15, max 6]
[92 available, Max 36]

(i) Answered reasonably well by most candidates
The other parts had mixed answers with well-prepared candidates who knew this part of the course scoring well, with those not knowing this part scoring less well.

END OF EXAMINERS' REPORT