

Subject ST8

CMP Upgrade 2017/18

CMP Upgrade

This CMP Upgrade lists the changes to the Syllabus objectives, Core Reading and the ActEd material since last year that might realistically affect your chance of success in the exam. It is produced so that you can manually amend your 2017 CMP to make it suitable for study for the 2018 exams. It includes replacement pages and additional pages where appropriate. Alternatively, you can buy a full set of up-to-date Course Notes / CMP at a significantly reduced price if you have previously bought the full-price Course Notes / CMP in this subject. Please see our 2018 *Student Brochure* for more details.

This CMP Upgrade contains:

- all significant changes to the Syllabus objectives and Core Reading
- additional changes to the ActEd Course Notes, Question and Answer Bank and Series X Assignments that will make them suitable for study for the 2018 exams.

1 Changes to the Syllabus objectives and Core Reading

1.1 Syllabus objectives

There have been no changes to the Syllabus objectives.

1.2 Core Reading

This section contains all the *non-trivial* changes to the Core Reading.

Chapter 7

Page 7

The second sentence on this page now reads:

“At the start of 2017 there were 105 syndicates at Lloyd’s.”

Chapter 15

Page 43

The following sentence has been added to the end of the second paragraph of Core Reading:

“This approach can also be used alongside more traditional curve fitting methods to derive loss distributions to use in capital modelling.”

Chapter 16

Page 26

The paragraph immediately preceding Section 3.2 now reads:

“The AIC looks at the trade-off of the likelihood of a model against the number of parameters: the lower the AIC, the better the fit. More precisely, the model with lower AIC is expected to have higher predictive accuracy. For example, if two models fit the data equally well in terms of the log-likelihood, then the model with the fewer parameters is the more parsimonious (and therefore “better”). This is because the more parameters the model has, the greater the amount of parameter error and the risk of over-fitting.”

2 **Changes to the ActEd Course Notes**

This section contains additional *significant* changes to the ActEd Course Notes. However, if you wish to have all the changes to the ActEd Course Notes, you will need to buy a full set of the up-to-date version (which you can do at a significantly reduced price if you have previously bought the full-price Course Notes / CMP in this subject).

Chapter 6

Page 6

In the first paragraph, the following sentence has been deleted:

“For example, in the UK, the solvency margin requirement is close to 16%.”

Chapter 7

Page 23

The first paragraph of ActEd text and the five bullet points that follow it have been replaced with:

“Institute and Faculty of Actuaries (IFoA) members practising in the UK need to comply with the Technical Actuarial Standards (TASs) that are issued by the Financial Reporting Council.”

Also on page 23, Question 7.10 has been deleted.

Page 30

Solution 7.10 has been deleted.

Chapter 16

Page 26

The third sentence of ActEd text now reads:

“For a model of the form $\mathbf{Y} = \mathbf{X}\boldsymbol{\beta} + \boldsymbol{\varepsilon}$ with a normally distributed error structure, we have seen that the estimated parameters are:”

Page 37

The following sentence has been added to the end of the page:

“(Technically, the definition of the hat matrix given above is only true when a normal error structure is used. For a non-normal model, the hat matrix is considerably more complicated!)”

Page 65

The sentence immediately following the heading “The hat matrix” now reads:

“The hat matrix \mathbf{H} is one of the outputs of the model-fitting process. If the error structure is normal, the hat matrix is given by:”

Chapter 18**Page 26**

The following sentence of ActEd text has been deleted:

“In other words, we choose factor Z such that the standard deviation of our credibility-weighted estimate is the same as it would be if we had fully credible data.”

Page 37

Towards the bottom of the page, the bullet point:

- $V_{ij} \times \text{Var}(X_{ik} | \theta_i)$ does not depend on k .

should say:

- $V_{ik} \times \text{Var}(X_{ik} | \theta_i)$ does not depend on k .

3 **Changes to the Q&A Bank**

This section outlines the *non-trivial* changes that have been made to the Q&A Bank. However, if you wish to have all the changes to the Q&A Bank, you will need to buy a replacement CMP (which you can do at a significantly reduced price if you have previously bought the full-price CMP in this subject).

Q&A Bank 4

Solution 4.7

The following point has been added to the end of the solution to part (ii)(c):

“This is because the more parameters the model has, the greater the risk of parameter error and of over-fitting. [½]”

Q&A Bank 5

Question 5.8

The first paragraph of this question has been changed, to read:

“The standard for full credibility for claim severity is 2,100 claims, and your observed claims data totals £10,132,000. The observed number of claims is 1,096 and the expected number of claims over the observation period is 1,000.”

The last paragraph of this question has been changed, to read:

“Calculate a credibility-weighted estimate of the average cost per claim for the particular class of business under consideration. [2]”

Solutions 5.7 and 5.8

Solution 5.7 part (iv) and Solution 5.8 have been amended. Please use replacement pages 7 and 8 provided at the end of this Upgrade.

Solution 5.15

The sentence immediately preceding the calculation of Z has been replaced with the following paragraph:

“Since the expected number of claims is unknown, we assume that the observed number of claims is an adequate approximation of the expected number of claims. Therefore the square root rule gives: $[\frac{1}{2}]$ ”

4 Changes to the X Assignments

This section outlines the changes that have been made to the X Assignments.

If you wish to have all the changes to the X Assignments, you will need to buy a replacement CMP (which you can do at a significantly reduced price if you have previously bought the full-price CMP in this subject).

However, if you wish to have your assignments marked by ActEd this session then you can order the current assignments free of charge if you have purchased them in the same subject the previous year (*ie* sessions leading to the 2017 exams), and have purchased marking for the 2018 session.

Assignment questions

Question X5.2

This question is now worth 3 marks.

Question X5.8

The sentence immediately preceding part (i) now reads:

“Your standard for full credibility is 1,082 claims and the expected claim frequency for the portfolio is 900.”

Part (i) is now worth 7 marks, so the total number of marks for this question is 10.

Assignment solutions

Solution X5.2

The third and fourth half marks have been deleted. The question is therefore worth a total of 3 marks.

Solution X5.8

The first two sentences of part (i) have been deleted.

Also in part (i), the final point in the solution has been deleted and replaced with the following:

“Therefore, if either of \bar{X} or M is inappropriate, P will be a less accurate estimator of future claims experience than if only the other (appropriate) estimator were used. [1]

No allowance has been made in \bar{X} or \bar{S} for:

- inflation or other trends [½]
- unusual claims experience [½]
- any changes in business mix / terms and conditions *etc* [½]

which may mean that past experience is not a good estimator of the future. [½]

The model assumes it's appropriate to use the square root rule. [½]

A Bayesian method may be preferred. [½]”

Therefore, the solution to part (i) is now worth a total of 7 marks.

In part (ii), the text immediately after the formula for Z_C now reads:

“where n is the expected number of claims for the portfolio and n_N is the number of claims required for full credibility.”

5 *Other tuition services*

In addition to this CMP Upgrade you might find the following services helpful with your study.

5.1 *Study material*

We offer the following study material in Subject ST8:

- Flashcards
- MyTest
- Revision Booklets
- ASET (ActEd Solutions with Exam Technique) and Mini-ASET
- Mock Exam A
- Additional Mock Pack
- Online Classroom.

For further details on ActEd's study materials, please refer to the 2018 *Student Brochure*, which is available from the ActEd website at www.ActEd.co.uk.

5.2 *Tutorials*

We offer the following tutorials in Subject ST8:

- a set of Regular Tutorials (lasting three full days)
- a Block Tutorial (lasting three full days).

For further details on ActEd's tutorials, please refer to our latest *Tuition Bulletin*, which is available from the ActEd website at www.ActEd.co.uk.

5.3 *Marking*

You can have your attempts at any of our assignments or mock exams marked by ActEd. When marking your scripts, we aim to provide specific advice to improve your chances of success in the exam and to return your scripts as quickly as possible.

For further details on ActEd's marking services, please refer to the 2018 *Student Brochure*, which is available from the ActEd website at www.ActEd.co.uk.

5.4 Feedback on the study material

ActEd is always pleased to get feedback from students about any aspect of our study programmes. Please let us know if you have any specific comments (*eg* about certain sections of the notes or particular questions) or general suggestions about how we can improve the study material. We will incorporate as many of your suggestions as we can when we update the course material each year.

If you have any comments on this course please send them by email to **ST8@bpp.com**.

Hence

$$\text{var}(X) = 1,666.67 - 33.33^2 = 555.56. \quad [1]$$

$$n_X = 1,280 \times \frac{555.55}{33.33^2} = 640. \quad [1]$$

So

$$n_S = 1,280 + 640 = 1,920. \quad [1]$$

[Total 7]

(iii) ***Expected number of claims with negative binomial claim frequency and variance twice as large as mean***

$$n_N = 8,000 = \frac{y^2}{k^2} \left(\frac{\sigma_N^2}{\mu_N} \right) = \frac{y^2}{0.02^2} \times 2, \text{ so that } y = 1.2649 \text{ and } P = 0.79410. \quad [1]$$

Under the new standard y will again remain unchanged, but we now need:

$$n_S = \frac{y^2}{k^2} \left(\frac{\sigma_N^2}{\mu_N} + \frac{\sigma_X^2}{\mu_X^2} \right) = \frac{1.2649^2}{0.05^2} \times \left(2 + \frac{555.56}{33.33^2} \right) = 1,600. \quad [1]$$

[Total 2]

(iv) ***Square root rule for partial credibility***

Since the expected number of claims is unknown, assume the observed number of claims is an appropriate estimate for the expected number of claims: [½]

$$Z = \sqrt{\frac{n}{n_F}} = \sqrt{\frac{1,230}{1,600}} = 0.8768. \quad [1]$$

*Note that the square root rule uses the **expected** number of claims (if this is available) in preference to the **observed** number of claims in the numerator. In this question, it is acceptable to use the observed number of claims, providing students state the assumption above.*

The advantage of the square root rule is that we can choose our partial credibility factor Z such that the variance of the data's contribution to the credibility-weighted estimate is the same as it would be if we had fully credible data. [1]

[Total 2]

Solution 5.8

Using the square root rule, the partial credibility factor Z is:

$$Z = \sqrt{\frac{n}{n_F}} = \sqrt{\frac{1,000}{2,100}} = 0.6901. \quad \left[\frac{1}{2}\right]$$

The average claim size of the observed data is $10,132,000/1,096 = 9,245$. [$\frac{1}{2}$]

So the credibility-weighted average claim size is:

$$(0.6901 \times 9,245) + (1 - 0.6901) \times 8,678 = \text{£}9,069. \quad [1]$$

[Total 2]

Solution 5.9

The stated effects are likely to be present in the accounts but are likely to be smaller than expected because of a factor that acts in the opposite direction to lapses:

- Reporting of new business is also delayed ... [$\frac{1}{2}$]
- ... resulting in an understatement of written premium and earned premium. [$\frac{1}{2}$]

If delays and volumes of lapses and new business are similar, they will tend to cancel each other out. [1]

If there is a tendency for either lapses or new business to predominate then a similar effect will occur at the end of each year, which will tend to cancel out ... [1]

... and unless conditions are changing rapidly, the distortions will be small. [$\frac{1}{2}$]

If the business is growing then the value of unreported new business is likely to be larger than the value of unreported lapses and therefore the profitability of the business may actually be understated. [1]

Will need to consider if the company is prepared to allow for this (*eg* have a negative provision) in its accounts. [$\frac{1}{2}$]