

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

May 2016

Subject CA2 – Model Documentation, Analysis and Reporting

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.

Possible models with an audit trail or summary are posted on the website. It should be noted that these include more detail than would ordinarily be possible within the time allowed for the examination.

The specimen solutions are based on one possible approach to modelling the assignment set but the examiners gave credit for any alternative approach or interpretation which they considered to be reasonable.

F Layton
Chairman of the Board of Examiners
May 2016

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

1. The aim of this subject is to ensure that the successful candidate can model data, document the work (including maintaining an audit trail for a fellow student and senior actuary), analyse the methods used and outputs generated and communicate to a senior actuary the approach, results and conclusions.
2. The subject is split into two papers, the first covers the objectives:
 - analysis of data.
 - development of a model with clear documentation.

The second paper covers:

- ability to analyse the methods used and the model's outputs.
 - ability to apply and interpret the results.
 - communication of the approach, results and conclusions to a senior actuary.
3. As the focus of the subject is on communication the majority of the marks are for the documentation and outputs generated rather than for technical modelling skills. For example, a technical mistake is only penalised once and students can still earn marks for accurate and clear communication of what was done.

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

PAPER ONE

Modelling

There were 30 marks available for accurate completion of the modelling steps and appropriate data checks. As with any data supplied for modelling, students are expected to do some analysis to confirm that the data supplied is reasonable and doesn't contain any obvious errors. This is an important area of the marking schedule for the CA2 exam. Although not specifically mentioned in the various steps to be completed, there was a reference to data checks in the section which details how many marks are available for each section. Many students are not including reasonableness checks in their Audit Trails and losing these marks.

Most students were able to use the random number generator correctly. Some students struggled to understand the concept of using one set of random numbers to get claim numbers, the other for claim amounts, and then linking them together. Very few students included reasonableness checks.

Most candidates were able to attempt all the sections of the model although some did not perform the chi squared test. Generally, candidates did not experience difficulties with the reinsurance modelling although some did not impose the upper limit. Some candidates put retentions the wrong way round so that the 50% retention was done correctly and the 60%

was done incorrectly.

The key statistics were often modelled correctly and most candidates managed to produce the percentiles and graphs.

Most candidates demonstrated reasonable modelling techniques and scored well in this area (up to 7 marks available).

Very few candidates managed to score well for the 'other (non-data) checks' where 8 marks were available. A large proportion of candidates are continuing to fail to score anything here. Candidates should be asking themselves whether the results they are seeing appear reasonable and what makes them reach that conclusion.

Audit trail

The audit trails were mostly well structured. Most candidates prepared audit trails that followed the order of their model, starting with an overview of the model and stating assumptions that were required for the calculations. Many audit trails were too short and methodology sections often lacked detail. The stronger candidates provided sufficient detail explaining their calculations with the very strongest also explaining why steps were being performed. A significant minority of candidates managed to produce a good audit trail even though the model itself had some weaknesses.

Almost all candidates were able to signpost in which sheet the calculations could be found, but the better prepared candidates were able to provide more signposting by saying where in the sheet specific calculations could be found, either by reference to tables or a combination of columns and rows.

To score higher marks, candidates should practise explaining methods clearly step by step with clear formula or equivalent.

PAPER TWO

Modelling

There were 15 marks available for accurate completion of the additional modelling and production of the required charts. The modelling was mostly well done with most candidates able to produce correct IRR/NPV for the additional scenario. A significant minority produced only a partially correct scenario. A common error was to allow the wool price to vary under scenario two. Often the graphs for wool/felts did not show a time series and showed the change instead which made it difficult to analyse trends in the summary. A large proportion of candidates did not include self checks on their calculations.

Summary

The structure of the summary produced was generally completed to a high standard. The examination question effectively provides an outline for the summary and the points to be included. The vast majority of candidates prepared a summary that followed the same order

of the items they had been requested to include in the summary.

There were a number of interactions in the second scenario which could be brought out and commented on which better prepared students did well. Candidates should leave time to consider the results and work out what is causing the observed patterns.

Most candidates managed to get good marks for the assumptions section, particularly those who made use of the audit trail document.

Most candidates included the basic results and graphs but many did not produce a table or statement of the prices. Many candidates showed the profits and IRR on separate charts rather than combined as requested.

A minority of candidates tended to reproduce portions of the audit trail in the methodology section of the summary. Whilst selective re-use of parts of the audit trail is acceptable, candidates are reminded that the audit trail and summary have different purposes so differences in style and depth are expected. The strongest candidates were able to provide a balanced level of method detail suitable to provide to a senior actuary. Weaker candidates failed to give clear method steps with accurate formula or descriptions.

Often no overall conclusions were made and weaker candidates lacked commentary on results and conclusions. Candidates that passed tended to have some explanation of the results and attempts at overall conclusions

Most candidates were able to produce a list of next steps, however candidates could not use points from previous exams so readily. New points were made which often did not get marks. However, many points not included in the specimen answers were still acceptable and gained the full three marks. In some cases candidates failed to give a broad enough range of next steps or alternatively did not explain them in enough depth to pick up all available marks.

45 of the marks are available for the commentary on the results and the conclusions and the next steps. Candidates are expected to show that they understand the results produced by the model by explaining them. A large number of candidates do not spend enough time on this section given how many marks are available here.

C. Comparative Pass Rates since the format of the exam was amended

Year	%
February 2016	51
November 2015	53
September 2015	68
May 2015	55
March 2015	52

Reasons for any significant change in Pass Rates in current diet to those in the past:

The Pass Rate is similar to the November 2015 exam, and in line with the March 2015 exam. The September 2015 had a higher Pass Rate but evidence suggested that candidates were very well prepared for this particular exam, when the exam was close to the main exam session.

D. Pass Mark

The Pass Mark for this exam was 60%.

END OF EXAMINERS' REPORT