INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

September 2015

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
January 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 in 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 31 marks available for accurate completion of the modelling steps and appropriate data checks. Few students went beyond the basic data checks of confirming min/max by considering standard deviation, uniformity, or performed a chi-square test. Any graphical check of data was usually limited to a scatter plot which was quite subjective to analyse, only a few students split into bands and analysed the distribution.

Most candidates produced a reasonable model for determining the exams passed for each candidate. The better prepared candidates were able to update for the withdrawal scenario, but weaker students did not often limit the exam passes to 10 before applying to persistency rates. A broad range of approaches to modelling the withdrawals aspect of paper 1 was accepted. Generally students completed this section adequately.

The quality of the graphs produced was high and most candidates scored well for these questions.

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

As with previous exams only the better candidates managed to score well for the 'other (non-data) checks' where 7 marks were available. A large number of candidates are failing to score anything or only achieve a single mark here. Candidates should be asking themselves whether the results they are seeing appear reasonable and what makes them reach that conclusion. For example, it would be reasonable that the average number of passes should be 8 as the pass rate was 40% and there were 20 attempts to pass. It is not sufficient to say that the results are "as expected" – candidates are expected to explain why the results are as expected to show understanding.

Audit trail

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. The stronger candidates provided sufficient detail explaining their calculations with the very strongest also explaining why steps were being performed. However a high number of students missed some sections of method, particularly the percentage qualified calculations and charts.

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, for example "in column F the speed is calculated by …".

PAPER TWO

Modelling

There were 15 marks available for accurate completion of the additional modelling step and production of the required charts. The quality of the graphs produced was very good and most candidates scored well for these questions. The additional modelling step to determine the compound mortality reduction factor was generally done well.

Summary

Most students completed the model, method and summary results to a good standard as well a reasonable range of next steps. 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.

Generally the assumptions section was poorly answered with few value added assumptions rather than repetition of assumptions given in the question.

The successful candidates were able to explain the different methodologies used in each scenario. This included the correct determination of the expectation of life from birth in the base scenario.

A number 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.

Most candidates included all the results in the summary that had been requested. Candidates tended to clearly answer the question concerning the expectations of life under the different scenarios. The key area which let students down was the section on results. The results discussion was often limited to a few observations rather than attempts at explaining the reasons for the results.

Often no overall conclusions were made (with conclusions sometimes just being restated results). Candidates that passed tended to have explanation of the results and attempts at overall conclusions.

Many candidates are failing to record basic observations and explain them. For example, it can be observed from the results that the expectations of life changes depending on the adjustment factor so the relative answers can be compared. Many straightforward marks were lost here. As a reminder, candidates are expected to show that they understand the results produced by the model by explaining them.

For the list of next steps, this was generally answered well and there were good marks available for the better candidates. There were plenty of variables used and assumptions stated for a good list of next steps to be produced.

C.   Comparative pass rates since the format of the exam was amended

Year	%
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 September 2015 pass rate has improved compared to the first two CA2 exams set in 2015. The quality of the exam submissions was generally higher this time and the students seem better prepared since the new format CA2 came in at the start of 2015.

END OF EXAMINERS' REPORT