



Assurances Committee

Summary of Working Paper 89: “Proposed “08” Series accelerated critical illness tables”

May 2016

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Introduction

This document provides a brief synopsis of Working Paper 89, which describes proposed “08” Series tables for accelerated critical illness. At the ages where data volumes are credible, the tables are based on experience under term assurance policies for the years 2007 to 2010 and are presented for consultation before they will be formalised, later in 2016.

For more detail, readers are encouraged to refer to the full Working Paper¹.

The underlying data

Much of the data underlying the proposed tables was collected in a special exercise in 2012 to 2014 in which insurance companies could submit data in a wide variety of formats. Data was collected for the years 2007-2011; we sought data for all five years to capture claims incurred in 2007-2010 that were settled by the end of 2011. The dataset is essentially similar to that underlying the All-Offices results for 2007-2010 presented in Working Paper 75; the principal difference is that we have now included an estimate of claims incurred in 2007-2010 but settled after 2011.

The proposed tables are based on term assurance data only; whereas the previous AC04 tables included data for endowment and whole life assurances. The latter are generally older products, with different underwriting and distribution practices and the Committee decided that the new tables would be more coherent if based only on the term data. The paper does, though, include a high-level comparison of the experience under endowment and whole life assurances with the graduated rates.

The dataset is larger than that used for the AC04 tables, with nearly 21,000 incurred claims. Chart 1 shows the claims in the term assurance dataset, sub-divided by age band and by duration. It will be apparent that there is a limited volume of data below age 30 or above age 60.

Factors reflected in the proposed tables

Our approach to the graduations was guided by analysis of the 2007-2010 dataset using a generalised linear model (GLM). This analysis confirmed that:

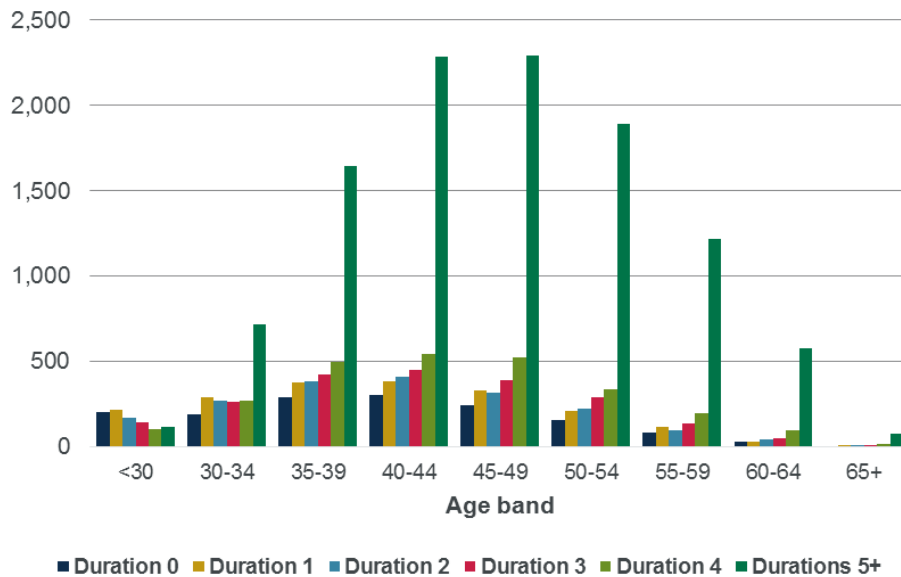
- The factors that were reflected in the AC04 tables – age, gender, smoker status and duration – were all important factors that should again be reflected in the graduations.
- It was reasonable to graduate the “All-Offices” data – i.e. it was not the case that any office had rates with a substantially different age or durational shape to the preliminary rates.

The analysis did not produce clear evidence that the shape of claim rates by age or by duration varied by other factors – distribution channel, sum assured band, product type and year of commencement. As a result, we decided not to reflect any of these factors in the proposed tables.

¹ Most of the CMI’s research is only available to employees of subscribers and to researchers, for non-commercial use. Details of how to access the full paper and the CMI’s other research can be found on the [CMI’s web pages](#).



Chart 1: Numbers of incurred claims by age band and curtate duration



“...there is a limited volume of data below age 30 or above age 60.”

The proposed graduations

Based on our analysis of the data, we decided to:

- graduate the ultimate experience only, and then consider experience at short durations;
- consider the four gender/smoker datasets independently;
- graduate male data over the age range 30-65, and female data over ages 30-60, to avoid including ages where the number of claims is small; and
- graduate the data on a lives-weighted basis only.

A number of different graduation formulae were tested for each dataset using the CMI Graduation Software (available alongside Working Paper 77). We used the Akaike Information Criterion (AIC) as the principal test statistic in selecting the graduation formulae, but also considered other tests. We also favoured a simpler model, with fewer parameters, where graduations were materially the same. In all cases, this approach led us to a simple Gompertz formula. The results of statistical tests and results graphs for the proposed graduations from the software are included in the paper.

The table below summarises the key features of each graduation:

	Male non-smokers	Male smokers	Female non-smokers	Female smokers
Formula	G(4)	G(3)	G(4)	G(3)
Durations	3+	1+	5+	2+
Age range	30-65	30-65	30-60	32-60

Note: the age range for female smoker data was restricted to ages 32-60 because graduation of ages 30-60 produced higher rates at ages 30 and 31 than at 32.



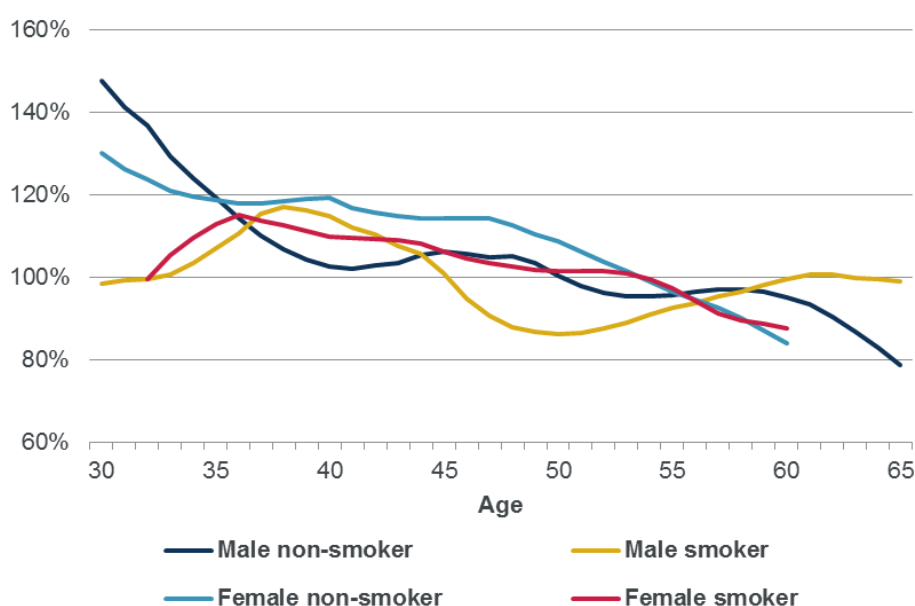
Select rates

Given the data volumes, we did not graduate the data at short durations. Instead, we set the selection discounts by considering the experience at ages 30-60 at each duration, relative to the graduated rates for each gender/smoker category. In all cases, we found that it was reasonable to express the select rates as a flat percentage of the ultimate rates.

Comparison of the proposed rates with existing tables

The paper includes comparisons of the proposed rates with several existing tables of accelerated critical illness rates, including the predecessor AC04 tables, produced by the CMI based on experience in 2003-2006. A comparison of the ultimate rates from the two sets of tables is shown in Chart 2.

Chart 2: Comparison of the proposed AC08 rates with the AC04 rates, by age



“...the two sets of rates differ significantly ... we hope that the new rates will be considered more robust.”

It is clear that the two sets of ultimate rates differ significantly: for three of the gender/smoker datasets, the new rates are generally higher at the younger ages but lower at the higher ages. The exception is the male smoker rates, which are broadly similar to the corresponding AC04 rates, albeit with variations at individual ages. There are also differences between the tables with regard to the length of the select periods and the selection discounts.

The AC04 rates were based on a mix of business types and were derived using a bespoke methodology, which was developed to make best use of the data then available to the CMI. By using more conventional methodology for the latest graduations, applied only to the term assurance data, we hope that the new rates will be considered more robust.

Extensions to younger and older ages

The data has only been graduated within the age range 30-65, where we were confident of the credibility of the data; however actuaries may need tables that apply across the full age range. In particular, although the graduated rates are based only on term assurance data, we do not intend to produce separate tables based on whole life assurances, which represents a much smaller dataset.

The paper describes our proposed approach to deriving rates at younger and older ages. As with the younger and older age extensions to the AC04 tables, we have sought a pragmatic means of extending the rates but other approaches may be equally valid.



GLM analysis

Working Paper 89 also includes the results of our analysis of the experience in 2007-2010, compared with the graduated rates, using generalised linear models (GLMs). This analysis helped to corroborate a number of aspects of the proposed tables but we also used it to investigate the significance of other factors available within the dataset – distribution channel, sum assured band, product type, year of commencement and calendar year.

There were limitations within the dataset that restricted the value of the GLM analysis; in particular the high proportion of data for which some of these factors were unknown and the limited number of offices that supplied data with multiple, identified distribution channels so the GLM has limited data from which to infer the impact of channel on experience. Despite these barriers, the paper details a number of interesting findings, including:

- There are significant variations by office – beyond those arising from statistical volatility – that are not explained by the other factors in the model. The analysis suggests that even a large office may need to adjust the rates by up to +/- 20%.
- Low sums assured (£0 - £25,000) exhibit lighter experience than the graduated rates.
- Experience was heavier in 2008 than in the other years; this could be a consequence of the introduction of Treating Customers Fairly (TCF) legislation into claim settlement practices.

Stand-alone critical illness

Working Paper 89 concentrates on accelerated critical illness data, but we have collected a much smaller volume of data for stand-alone critical illness insurance. We think that the low volume of data is consistent with the market – rather than being a feature of data submitted to the CMI – but this does mean that we do not intend producing tables for stand-alone critical illness insurance.

Recognising this, the paper includes a high-level comparison of the experience of the 2007-2010 stand-alone critical illness data with the graduated rates.

Associated outputs

Alongside the paper, the Committee has also released:

- A spreadsheet containing the proposed rates, including the extensions to younger and older ages;
- A set of All-Offices results for 2007-2010, restated to compare the experience of the dataset with the proposed rates; and
- The datasets that underlie the graduations; reformatted to enable easier use in the CMI Graduation Software; allowing users to assess our choice of age range, grouping of durations and graduation formulae.

What next?

The paper concludes with a list of areas where the Committee is keen to receive feedback from potential users of the tables; however we have not yet set a closing date for responses.

The Committee is already well-progressed on proposed graduations of the corresponding dataset for mortality-only term assurances and hopes to release these in June. We will then announce the consultation process for both sets of proposed tables, including an online survey to enable easier participation. We also intend to host a discussion forum on both sets of proposed tables.

We hope to finalise both sets of tables later in 2016.

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