CMI Working Paper 50
One Year on,
Two Years Further Forward

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Introduction & Background

Around this time last year Working Paper 43 (WP43) was published which generated a table of diagnosis rates for accelerated critical illness (CI) business based on claims settled between 1999 and 2004. Over the course of the last year the work of the CMI CI Committee has moved on – and by more than one year! Working Paper 50 (WP50) has moved the analysis by the CI committee on two years and has recently been published based on data up to 2006.

SCOR provided a high level summary of WP43 in February 2010 and this paper is intended to provide a similar summary of WP50. We acknowledge that the hard work has been undertaken by the CMI, thank them for that and encourage you to read the full paper rather than just this summary.

The WP43 rates were based on around 18,500 claims and, other than CIIT00, was the first table of accelerated CI decrement rates derived from insured lives experience. The table was a significant advance from the population tables historically used around the industry (CIBT) in that they differentiated by sex and smoker status and included a select period.

It is worth noting that draft rates using 2003-06 data were released to CMI member offices in August 2010 and that the spreadsheets which sit behind the WP50 analysis are also available to member offices. The availability of spreadsheets is welcomed as it allows members to consider deriving their own rates based on their view of fit and/or appropriate constraints.

This summary of the key content of Working Paper 50 has been produced by Jamie Leitch, Head of Pricing at SCOR Global Life UK and a member of the CMI Critical Illness Committee. SCOR is solely responsible for the content of this note.

SCOR would be happy to discuss and share views on any issues raised within Working Paper 50, this summary or any additional questions that follow on.

Working Paper 50 – a summary of contents

The primary aims of Working Paper 43 were to demonstrate a methodology and generate morbidity diagnosis rates. Having successfully done this the key purpose of WP50 is to produce a new set of rates that the Actuarial Profession will officially adopt in the future – releasing the paper for feedback is a key stage in that adoption process.

The Working Paper contains:

- An overview of the 2003-06 dataset, which includes around 20,000 claims, upon which the new rates are based. This period also represents a much more stable period of time than WP43 with respect to the offices contributing to the CMI – the changing mix of offices over time is a criticism often levelled at CMI results.

- An update on the progression of claims from diagnosis through to notification, admission and settlement. This section is a repeat of sections in previous working papers but serves to highlight the main issue within CMI CI data – the claims included are those settled in the exposure period rather than those occurring (being diagnosed) in the period. There has been an increase in the provision of event dates within this dataset relative to 1999-04, however there is still a need to estimate these for a substantial proportion of claims.

- The derivation of the 'all cause' diagnosis rates (between ages 25-65). This is consistent with the approach used in WP43 and uses a pragmatic approach rather than one under-pinned by a statistical model. The spreadsheets that back this work are being made available to member offices.

- A summary of the methodology used to extend the age range beyond age 65 and to younger ages where there is very limited data. This is a new development from WP43 where rate creation was restricted to the core ages.

- An overview of the key features of the diagnosis rates including a comparison against CIBT02 as well as experience by calendar year for the four years covered by the dataset.

  A/E by calendar year based on WP50 diagnosis rates are shown in the graph above.

- The diagnosis rates themselves.

A/E by year based on WP50 rates
Source: Working Paper 50 fig. 9.1
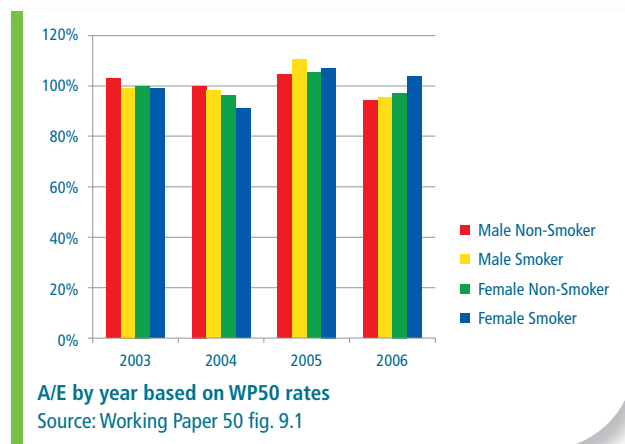
- A summary of the further work that is planned by the Committee. This work is expected be published in a further Working Paper in Spring 2011. The further work includes:
  - indication of experience by amounts
  - indication of variation by commencement year
  - analysis of claim experience by distribution channel and product type
  - production of some 'cause-specific' rates for the main causes of claim
  - production of some rates to be used in analysis of Stand Alone CI business

Features of the Table

Selection discount

In WP43 the selection discounts where one of the most interesting features within the table. The most obvious feature was Dur 0 rates being higher than Dur 1 rates for male smokers. Both WP43 and the SCOR summary considered the possibility of anti-selection. The WP50 rates have a more 'standard' selection pattern with rates never decreasing with duration. While this certainly doesn't rule out the existence of anti-selection (who is to say that the selection discount would not be deeper and more consistent with mortality rates if we were able to strip out any anti-selection) it does provide some comfort by restoring the actuarial norm.

It is also noticeable that there appears to be less of a select effect on CI business than on recent mortality standard tables. Working Paper 43 produced some 'cause specific rates' for male non-smokers which showed, at a high level, that claims recorded as death had a deeper discount than cancer, stroke and heart attack. It will be interesting to consider the selection by cause further when the next Working Paper is released in Spring.

The WP50 table displays the following selection shapes:

Male Non-Smoker: Dur x as % of ultimate rates

Male Smoker: Dur x as % of ultimate rates

Female Non-Smoker: Dur x as % of ultimate rates

Female Smoker: Dur x as % of ultimate rates

Source: Working Paper 50 fig. 8.4 and Working Paper 43 fig 6.4 (approximately restated for graph by SCOR)

This selection pattern shows a few changes relative to WP43 rates. This relates to both shape (ie how rates are grouped by duration) and by discount relative to the ultimate rates. The main features are:

- A steepening of the Male Smoker selection discounts
- A relative increase in discount at Dur 0 for Female Non Smokers
- Removal of the discount at Durs 2-4 for Female Smokers

A less obvious feature within the selection discount is the more stable mix of offices. This mix of office is a feature that SCOR has recently observed through some very odd durational results in our own experience analysis results. As our mix of clients has changed we find different clients contributing with different weight at each duration. The significant variation we see between the experience of different offices can therefore hide true underlying selection shapes.

The increased stability within the 2003-06 dataset is therefore a very pleasing feature although there remain features within the data which could have a distorting impact. The two most significant of these are the changing volumes of business being written by each of the companies represented and also the changing underwriting standards within the industry over time.

Older Ages

The exposure data within the CMI analysis is heavily weighted towards ages under 50. This is a result of a number of factors; the relative immaturity of the market, the impact of lapse rates and the age restrictions (maximum ages at entry and expiry) within most contracts. However, it was felt appropriate to extend rates to older ages for the benefit of those who may have whole of life contracts or older expiry ages.

The CI Committee took a very pragmatic approach in developing the older age rates where no data exists. A number of different methods were considered each of which, along with various other possibilities, may be equally valid. The benefit of a table with older ages is largely as a tool to analyse older age experience as it emerges to help determine the 'true' claim level – as a pricing actuary caution should definitely be exercised and thought given to the appropriateness of the rates for the purposes they are being used (as it should at younger ages and with all 'standard tables').

The method is based on the assumption that insured experience tends towards population experience with age. This is a feature that is seen in the majority of mortality analysis and intuitively makes some sense as the impact of underwriting and socio-economic variation wears off.

However, as with everything there are arguments against the approach:

- does socio-economic impact vary for CI where increased wealth may mean increased access to medical services and therefore an increased chance of diagnosis?
- is the pattern of mortality relevant for CI conditions which may not lead, directly or imminently, to death but could be valid CI claims at older ages eg Alzheimer's?

However the theory seems reasonable and it will be interesting to see the feedback from readers on this subject.

Rates to age 85 are then generated from CIBT02 (assumed to be the most appropriate population table) by applying a smooth and increasing proportion to those rates. One area of weakness perceived by SCOR (although it is highlighted within the Working Paper) with the work is that the smooth progression of the percentage of CIBT02 hides the fact that CIBT does not progress smoothly by age – there is a drop in rates for females at age 66 when TPD is removed. This then feeds through into the diagnosis rates derived in Working Paper 50.

Beyond age 85 the rates are extrapolated such that a smooth progression is made to a value of 1 at age 110.

Level of Rates

The following graphs provide an indication of the change in rates (for selected durations) between the two rates series produced by the CMI.

The change in rates by age and duration between WP50 and WP43 makes a high level comparison difficult. However, the table on the next page provides some indication of change in risk cost for a number of model points from moving from WP43 rates to WP50 rates.

At a very high level there has been a significant (approx. 10%) reduction in rates for males, a slight reduction for female non-smokers as a result of the significant reduction in rates at Duration 0, and an increase in rates for female smokers at the key insurance ages.

The results are consistent with high level A/E results by calendar year that have been produced previously by the CMI. Unfortunately the rates only relate to the period 2003-2006 and do not provide information about recent changes in underwriting, the impact of the revised ABI claim guidelines or any underlying trends that may exist within the data.

SCOR's most recent internal analysis suggests that, at a high level, experience since 2003-06 has deteriorated.
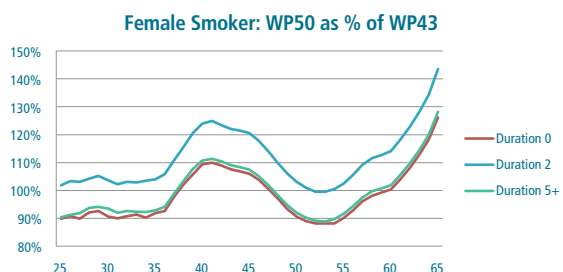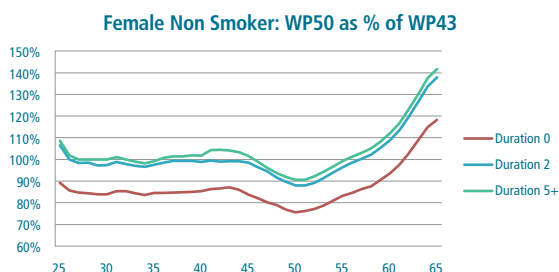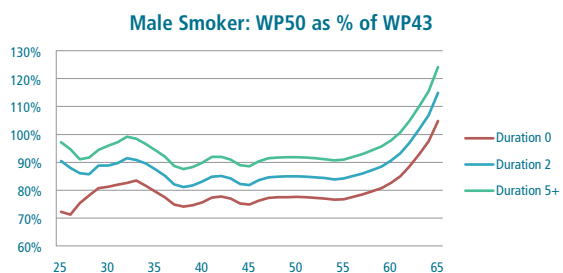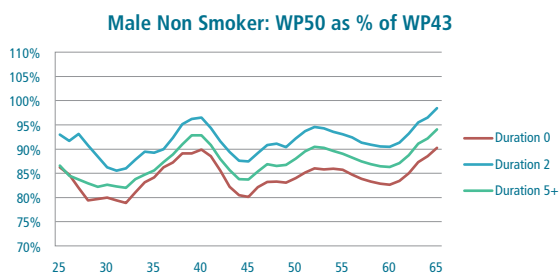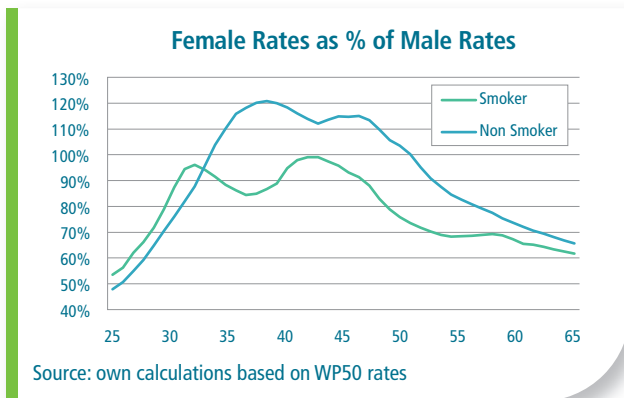

Source: own calculations based on WP43 and WP50 rates

Sex / Smoker Status	Age at Entry	Term (years)	Sum Assured	Price in Risk Cost
Male Non Smoker	40	20	Decreasing	-11.4%
Male Non Smoker	35	25	Level	-11.5%
Male Non Smoker	55	10	Level	-10.3%
Male Smoker	40	20	Decreasing	-10.0%
Male Smoker	35	25	Level	-9.3%
Male Smoker	55	10	Level	-3.6%
Female Non Smoker	40	20	Decreasing	-3.5%
Female Non Smoker	35	25	Level	-1.5%
Female Non Smoker	55	10	Level	+8.9%
Female Smoker	40	20	Decreasing	+3.4%
Female Smoker	35	25	Level	+0.4%
Female Smoker	55	10	Level	+6.5%

Source: own calculations based on WP50 rates

Gender Differentials

With the prospect of the ruling on the Test Achats case hanging over the industry, it is worth considering what these revised rates from the CMI tell us about the differentials between male and female morbidity. The graph below shows ultimate female rates as a percentage of ultimate male rates for both smokers and non-smokers:

Female Rates as % of Male Rates

Source: own calculations based on WP50 rates

The differentials between males and females within the rates (at ages 20-65) derived in WP50 can be split into 3 areas:
- early ages when female rates are lower than male rates (presumably as a result of accidents amongst males) but increasing towards the male rates.
- middle ages when the relationship between male and female rates levels out with non-smoking females showing significantly higher rates than males and smoking females showing slightly lighter rates.
- older ages when female rates become a reducing proportion of male rates and are significantly lower.

This analysis paints an interesting picture and the test acahts story on CI is certainly worthy of being considered in isolation of mortality rates – the 'prudent' approach of setting all new business rates to male rates, if there is a need to quickly move non-differentiated new business rates, may not always be that prudent after all, based on the CMI analysis.

Conclusions

It is very pleasing to see the CMI CI Investigation catching up with other committees (who have been in existence for longer) and produce a set of decrement rates to be proposed to the Profession for adoption as a standard table. Working Paper 50 continues the good work of previous years in helping develop the industry's understanding of CI claim rates.

This Working Paper may not feel like the breakthrough that Working Paper 43 was, however it is clearly an important step in validating the work of the previous paper and the consistency of offices within the dataset helps provide increased comfort in the rates. Having a formal table is a great platform from which to build for actuaries around the industry but also for the CI Committee who now have an opportunity to move on with more detailed analysis in the future.