CMI Working Paper 43 – a better diagnosis?

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Introduction & Background

The Continuous Mortality Investigation (CMI) has recently published Working Paper 43, which is the fourth in a series of working papers issued by the CMI Critical Illness Committee. It follows on from Working Papers 14, 28 and 33 which largely dealt with addressing issues caused by the way in which the CMI collect data from member offices - the CMI collects exposure and claims settled during any given year. Ideally analysis should compare claims diagnosed otherwise there is a mismatch due to the significant delay between diagnosis of a critical illness (CI) event and settlement of a claim. Those working papers suggest methodologies to adjust the experience to make it more appropriate.

Working Paper 43 is an exciting development as it is the first time that the CMI has published insured lives diagnosis rates – something the industry has been desperately seeking for the last decade. There are a number of significant features within these rates with implications for how experience is viewed and how business should be both priced and underwritten.

To date companies have been basing their decrement rates on a number of possible sources – a comparison of these is included in the table below.

	CIBT93	CIBT02	IC94	CIIT00
Author	CI Healthcare Study Group	CI Trends Research Group	Society of Actuaries (Ireland)	GenRe
Dates	Centred 1993	Centred 2002	Presented in 1994	1999-02 CMI data
Selection	None	None	None	3 year select
Lives	UK population	UK population	Irish insured	UK insured
Gender	Differentiated	Differentiated	Differentiated	Differentiated
Smoker Status	Aggregated	Aggregated	Aggregated	Differentiated

This summary of the key content of Working Paper 43 has been produced by Jamie Leitch, Head of Pricing at SCOR Global Life UK and a member of the CMI Critical Illness Committee.

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Working Paper 43 – a summary:

This Working Paper is clearly of great value to the industry (both for those involved in pricing and those on the reserving side). This paper is simply a summary of the Working Paper - we acknowledge that the CMI did all the hard work, thank them for it and would encourage you to read through the whole paper.

The Working Paper contains:

• A high level summary of the UK Critical Illness Market which provides an interesting insight into the diagnosis rates that are derived.

• An explanation of the derivation of the 'all cause' diagnosis rates – unlike other sets of rates produced by the CMI these have been derived in a very pragmatic way, with no statistical models or elaborate graduations (this can be seen as a good or a bad thing depending on your viewpoint).

• An explanation of the issues encountered in deriving the rates, accepting that a number of subjective decisions have had to be made in their creation.

• Some sample diagnosis rates for individual claim conditions (male non-smoker only) accepting that in doing so the analysis becomes less credible due to smaller volumes of claims etc.

• Comparisons of the 'all cause' diagnosis rates against other industry tables (those highlighted on page 3).

• Sensitivities around the results, considering the impact of slower/quicker claims settlement.

• The 'all cause' diagnosis rates themselves.

Helpfully, the CMI is making available, to member offices, the spreadsheets backing the work. This has been done to reflect that different actuaries may wish to interpret the data in different ways or apply different constraints – inevitably leading to different diagnosis rates.

The table created by CMI, called WP43 rates (the lack of an imaginative title reflects that this table has not been promoted for formal acceptance by the Actuarial Profession – instead it is hoped to repeat the exercise on more recent data and use that to generate a formal table), covers considerably more insured lives data than previous tables. The rates are based upon claims settled between 1999-2004 – around 18,500 claims.
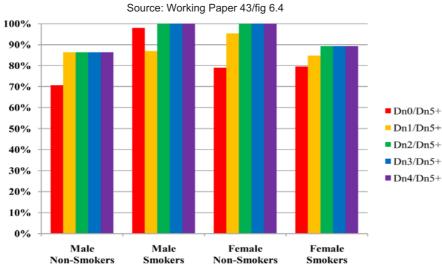
The rates created cover accelerated CI products on a lives basis and include allowance for a durational impact. They make no allowance for a number of features that may be of interest (and it's worth remembering that published mortality tables don't necessarily allow for these either!):

• Experience by amounts.

• Differences between distribution channels.

• Mix of offices contributing and therefore different claims and underwriting standards as well as different conditions covered.

• Changes since the experience eg changing definitions, increased use of tele-underwriting, changes in ABI claim guidance.

• Difference between product variants (term v WOL, level v decreasing).

Features of the table

Selection

Probably the most interesting feature of the new rates is the selection shape. The CMI have started from the position of analysing data (for all claims causes) by durations 0 to 5+, consistent with standard mortality tables, and then considering how the actual experience should best be reflected in tables.

The resultant tables then display the following selection shapes:

Source: Working Paper 43/fig 6.4

Male Non Smoker:

- Duration 0: approx 70% of the ultimate rates
- Durations 1-4 (grouped): approx 85% of the ultimate rates
- Duration 5+ is the ultimate rate

Male Smoker:

- Duration 0: approx 97% of the ultimate rates
- Durations 1: approx 85% of the ultimate rates
- Duration 2+ is the ultimate rate

Female Non Smoker:

- Duration 0: approx 80% of the ultimate rates
- Durations 1: approx 95% of the ultimate rates
- Duration 2+ is the ultimate rate

Female Smoker:

- Duration 0: approx 80% of the ultimate rates
- Durations 1: approx 85% of the ultimate rates
- Duration 2-4 (grouped): approx 90% of the ultimate rates
- Duration 5+ is the ultimate rate

Specific constraints have been applied in producing the tables and with respect to selection the major constraint is that rates cannot decrease with duration. There is one exception to this however – where the experience suggests anti-selection may be inherent in the data this constraint is not enforced.

At a high level, the selection pattern appears to be a reasonable fit to the underlying data (given the constraint). Given the different split of causes of claims, particularly by sex/smoker status, and differences in effectiveness of the underwriting for different conditions it seems entirely reasonable that different shapes exist over the four rate sets with respect to depth and length of the selection effect.

What does look strange intuitively is the progression of rates. For example on male non-smokers there is positive selection discount in the first year before rates reach a fixed level for the next 4 years. It is difficult to think of a reason why rates would suddenly leap by 15% after this period.

One possible explanation could be the mix of business within the data and the durational grouping chosen – Dur 5+ data will contain claims which could have been underwritten a number of years before the Dur 4 and may be from a very different mix of distribution, products and underwriting standards applied. However, the fact that the same feature does not exist on male smokers or female non-smokers suggests that this may not be the reason.

Another reason could be a more relaxed claims assessment after 4-5 years due to the reduced risk of non-disclosure. However, this is more prevalent on mortality business than CI and together with the lack of a similar feature on other data sets suggests this is unlikely to be the reason.

The simplest conclusion may simply be that random variation exists.

Importantly, the CMI are very clear that different actuaries, in analysing the data, will come to different conclusions and they have made available spreadsheets to allow individuals to derive their own rates.

Anti-Selection

The constraints applied allow for possible anti-selection. In practice, this potential anti-selection is seen only in one area – Male Smoker rates at Duration 0 are greater than at Duration 1.

The paper states that in considering cause of claim this 'possible' anti-selection looks to be most prevalent with respect to heart attack and deaths, with the possibility that an issue exists with cardiovascular sudden and therefore a large number will be cardiovascular.

Looking at the cause specific rates that are derived in the paper (for Male Non-Smokers only), we see that for heart attack the Duration 1 rates are greater than Duration 0. This is the opposite of the 'all cause' male smokers and suggests that any possible anti-selection is more relevant to smokers. On female smokers heart attack claims makes up less than 7% so it is unlikely that there is enough credible claims to back up this possible theory.

Having considered this further with our claims and underwriting teams we do not feel that anti-selective behaviour by male smokers with respect to cardiovascular disease is obvious. However we do consider it plausible as explained below.

There are many circumstances in which symptoms may present before a significant heart attack. We also believe that family history may make sufferers more aware of the impact of their symptoms – note that the underwriting process would only generally investigate family history where it was at young ages or relevant to more than one family member. As a result, it is possible for anti-selection to take place.

Any anti-selection may be more of a feature on smokers as warnings over the damage they are doing to their health may lead to them being more suspicious of any symptoms – non-smokers are more likely to assume that they are healthy and 'brush aside' any symptoms.

On the other hand cardiovascular anti-selection could exist regardless of smoker status and simply be more obvious in smokers as poorer general health leads to a quicker onset from symptoms to a claimable cardiovascular incident. Here anti-selective claims at early durations would be more obvious for smokers.

Given this feature in the CMI data we have reviewed a number of early male smoker heart attack claims from the SCOR claims database. The findings, while not entirely conclusive, did indicate a reasonable proportion of cases had some form of family history or symptoms at outset. Few of the specific claims causes in the cases looked at appeared to be smoker related, however the smoker status will obviously have had some impact on general health. This is an area of underwriting which is worth considering further.
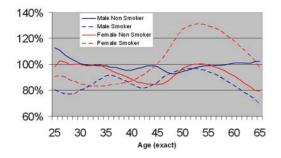
On the positive side it is noticeable from previous CMI results (albeit comparing actual settled claims to expected settled claims) that the feature of possible male smoker anti-selection appears to be more evident in older data. This may suggest that our underwriting standards have already improved.

Shape by Age

In creating the rates the shape by age has been derived by looking at the experience at an all duration level but has been applied at an individual duration level. As a result any different selection impact by age

is missed - in theory the different causes of claim by age and the varying levels of underwriting efficiency associated with each condition should see differences.

As an example, for male non-smokers at young ages and early durations we would expect a significant proportion of the claims to be from accidental deaths. As a result we would expect the shape by age to lead to higher rates at these young ages relative to older ages for Duration 0 than for the ultimate rates. The A/E values seem to support this logic with a decreasing A/E trend values from age 20-45 at Duration 0 but more stable values at Duration 5+.

WP43 rates as a % of CIIT00 (ultimate)
Source: Working Paper 43/fig 6.7

An interesting feature is that the shape by age is fairly different at key ages 40-55 to the insured lives table CIIT00 (see graph) – the paper states that this is because GenRe were guided by population tables where CMI credibility was low (based on claims/exposure). The difference in shape is therefore most pronounced for female smokers.

The rates at older ages seem to progress (for most data sets other than Male Non-Smoker – see figure 6.2 in Working Paper) in a fairly linear fashion, rather than the compound growth we have come to expect from mortality rates. However, given the volumes of data at these older ages this may simply be a function of focussing efforts towards the more significant age ranges.

The working paper does point out that shape by age is a potential area of improvement and again provision of the spreadsheets is incredibly useful.

Level of Rates

Unsurprisingly, the derived rates are considerably lower than the (CIBT) population tables. What is not clear is how the difference between population and industry experience breaks down – is this because of the impact of underwriting, socio-economic mix or the result of differences between CI definitions (essentially how illnesses are categorised for data sources such as ONS relative to the CI definitions enforced within the industry).

The rates are also lower, in general (running between 80-100% for ultimate rates), than CIIT00 (derived from CMI data 1999-2002). This seems appropriate given that the WP43 rates add 2003-04 where the experience appears to have been significantly better than the earlier years of the 1999-2002 quadrennium.

One feature that was not present in the other tables (discussed above) is that female rates are higher than male rates for some key ages. This applies on the non-smoker rates only.

Previously, only CIIT00 has differentiated the level of rates by smoker status and the CMI work is reasonably consistent. On Males the smoker ratio (of ultimate rates) rises with age to a peak just in excess of 200% around age 50 before falling. The speed of the fall is however much sharper than displayed in CIIT00.

For females, the ratio rises consistently from age 35 to around 180% at age 65. The female smoker rates therefore look considerably heavier relative to non-smokers than in CIIT00 where the ratio varied between 120-140%.

TPD

The Working Paper derives some TPD specific rates, and shows the claim delay pattern for TPD relative to other claim causes. The information provides some useful insight into the ABI TPD debate.

TPD stands out amongst the conditions as having a much longer delay between diagnosis and settlement. Around 50% of claims take over 300 days to settle from date of diagnosis compared to about 15% for other causes.

The other interesting feature is that the TPD rates contain a very significant selection discount. Given that, for a number of providers, their books will be fairly immature it should be expected that more insurers start to see increasing numbers of TPD claims relative to other causes ie more contentious, drawn out claims could be just around the corner.

Demonstration of the impact of WP43 rates

In order to consider the impact that the WP43 rates could have on different portfolios, ie different mix of business by age, sex, smoker status and duration, we ran an experience analysis for 5 different companies (using SCOR data) to compare the difference between results with WP43 rates and CIBT02. The results are shown below:

	A/E (CIBT02)	% of Company A	A/E (WP43)	% of Company A
Company A	38.6%	100.0%	89.5%	100.0%
Company B	40.2%	104.1%	93.3%	104.2%
Company C	40.3%	104.4%	92.7%	103.5%
Company D	43.5%	112.6%	106.5%	118.9%
Company E	46.0%	119.0%	113.5%	126.8%

From this it can be seen that the view of the experience of different companies has changed when analysed against the new tables. This is seen in two ways:

- Order: Company B and Company C have changed relative experience – B looks better when compared against C when analysed against CIBT and slight by worse when analysed against WP43. The impact is not too significant however.

- Relativity: Company D and E now appear much worse than Company A

By picking 5 random companies we pick up some of the differences – however it is easy to construct sample portfolios where the impact between offices is more significant.

Conclusion

Working Paper 43 (and the accompanying spreadsheets) is a significant step forward for the industry and provides valuable insight into insured lives experience on accelerated CI products. In particular WP43 rates provide the first real industry opportunity to consider the appropriate selection discounts and the durational impact on experience analysis.

There are a number of interesting features that can be seen in the rates that have been produced and as always with actuarial work there are a number of additional questions that have been raised.

SCOR would be happy to discuss and share views on any issues raised within the working paper, this summary or any additional questions that follow on.

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