

**ARC Webinar Series 2018**

**02 October 2018 – Modelling, Measurement and management of Longevity and Morbidity Risk**

**Additional Questions from the Audience**

During the live webinars we received a large number of questions from the audience and it was not possible to answer all in the one hour sessions. Below are answers to the additional questions – these answers were provided by by the research Co-investigators; Dr Torsten Kleinow and Dr George Streftaris (with some input from the Principle Investigator; Professor Andrew Cairns).

## AM Webinar Questions (09:00 - 10:00 BST)

**Q. Do you think the slowdown in the UK is permanent?**

TK: I do not know. I think the slowdown is a significant change in the trend rather than just noise. Since we do not know whether the slowdown is permanent, I would suggest to use stochastic models and consider different sources of uncertainty about future mortality, including parameter uncertainty.

**Q. Are there any regional effects in your IMD data?**

TK: No, not in the IMD deciles. Regional effects are hidden in the IMD deciles since all LSOA's are ordered only according to the IMD score ignoring geographic information. However, when we consider individual components of the IMD, we can also consider geographic information, e.g. rural vs. urban etc. This is part of our ongoing research.

**Q. Can you comment more on how females compare to males**

TK: In general, females experience a lower mortality rate than males. However, the relative differences between IMD deciles are similar, maybe slightly smaller than the differences for males.

**Q. Have there been any changes in the measurement of the factors underlying the index calculation? Are they consistent over the time period?**

TK: We did not investigate changes in the calculation of the IMD or its components, since we consider deciles according to the 2015 ranking of LSOA's. We keep those fix, so that the LSOA's in any decile do not change during the observation period.

**Q. Did your research consider transition rates between different IMD deciles?**

TK: No, we are not measuring the transition of LSOA's from one decile to another. We take the ranking in 2015 to define deciles and then consider the mortality rates from 2001 to 2015 for those deciles. We do not take the ranking of LSOA's in other years into account.

**Q. Is it possible to test whether different weightings to allocate people to the various deciles would give a better fit to the model?**

TK: The weights of different components in the IMD are fixed by the UK government and the ONS. We just use that index. However, in our current research we consider individual components, and provisional results indicate that income differences are strongly linked to differences in mortality, which suggests that maybe income should have a higher weight in an index that is used to explain differences in mortality.

**Q. What metrics are you using to determine if one model is better than another?**

TK: We are currently using a combination of the BIC (Bayes Information Criterion), likelihood ratio tests and some graphical diagnostics (residual plots …). Not just a single measure.

**Q. Has the position of hospitals and care homes been taken into account as to where they sit within IMD areas?**

TK: No, we have not taken that into account. For individual LSOA's this effect would be relevant. However, I would argue that for the IMD deciles the effect is not too strong since each decile will have a number of LSOA's with hospitals or care homes and other LSOA's without a hospital. So, on average across a decile, there is no effect.

**Q. Have there been any changes in the range of illnesses covered in CI?**

GS: Yes, there have been small changes in the range of illnesses covered in the UK. However these concern relatively "rare" illnesses and do not have a material impact for the purposes of our research.

**Q. Why do you think CI claim rates are going up?**

GS: A possible explanation is that as the CII market is growing, and the product is becoming more popular, the claim rates are catching up with morbidity rates in the more general population which are generally higher.

**Q. Is there any effect of change in underwriting practices considered between earlier and later CI data please?**

GS: Underwriting practices have most likely changed over time. This has not been taken into account in our modelling. It seems possible, however, that such changes (perhaps associated with "stricter" underwriting) would potentially lead to lower claim rates. Our analysis demonstrates an increasing trend in rates, despite this potential impact of underwriting.

**Q. Why did the later critical illness set \*not\* include office / cause / date of diagnosis?**

GS: The CMI asked for relevant information in their surveys. However, the response was either low or of inadequate quality for the data to be reliable.

**Q. Why is there no 2006 data?**

GS: The CMI collects data in 4-year periods. For purposes related to the timing of our research we did not use the entire data set for 2003-2006.

**Q. Why were Cause and Diagnosis not available in the more recent dataset? Has the CMIB got worse at collecting data?**

GS: The CMI asked for relevant information in their surveys. However, the response was either low or of inadequate quality for the data to be reliable.

**Q. As the majority of the policies are from accelerated policies rather than stand alone, does this study include the death claims or have these been excluded?**

GS: Our research includes death claims when "accelerated" claims from all causes are concerned.

**Q. Have the CI claim definitions become more onerous over the period? Would this increase effect in the rate of claims seen?**

GS: CI claim definitions and illness definitions are becoming more complex - and are also changing. I think this does not have a significant impact on our analysis, as the vast majority of claims are associated with causes with less onerous definitions (cancer, death, heart attack and stroke).

**Q. Isn't the lower Cancer rate for insureds because of the qualifying criteria for a cancer claim in terms of severity? Are you comparing like with like?**

GS: This is indeed the case for certain cancers, for example in situ cases, prostate cancer, melanomas etc. Wherever possible (i.e. when the data include relevant information) we are taking this into account. With our current analysis, the comparison is not 100% like-for-like.

**Q. These are interesting observations but are based on very old data. Were there no later periods available from the CMI?**

GS: We are interested in obtaining and using more recent data. As expected, there are justified time considerations associated with data collection, clearing and analysis before the CMI can release new data for academic research.

## PM Questions (17:00 - 18:00 BST)

**Q. How do the differences in improvements vary across ages other than 65?**

TK: In general, improvement rates are better for the least deprived, as we see, for example, from the period effect of the Lee-Carter model in the webinar slides. The levels of improvement are clearly different for different ages with high ages tend to have lower improvement rates than younger ages.

**Q. Is this standardised by age?**

AC: No, the webinar slides plot death rates at single ages, and so no standardisation (e.g. across age ranges) is required.

**Q. Have you extended the analysis to Scotland?**

TK: Indeed, for Scotland the SIMD is published, but we don't have mortality data for the Scottish equivalent of LSOA's, so we did not extend our analysis to Scotland or any other region than England.

**Q. But you mentioned that the mortality rates between various socio-economic groups converge as the age progresses. So how does this matter to pension actuaries?**

TK: Mortality differences between groups are indeed small for ages above, say, 80 or 85. However, for ages 65 to 80 those differences are substantial, and those ages are important for pension actuaries. Also, the survival rates to retirement age are affected by differences at relatively young ages (< 65).

**Q. Does this all depend on the first reference year? And how long should we look at this in the past before projecting it in to the future?**

TK: Unfortunately, we only have data since 2001, and the observation period is always relevant for empirical results. Since there is all this uncertainty, I think, stochastic models should be used, and model and parameter uncertainty should be taken into account.

**Q. Have you considered the relative importance of the various components of the deprivation index as predictors of mortality differences?**

TK: In our current research we are looking at exactly this question. So far, it appears that income deprivation is strongly related to mortality, but we are also looking at other variables. I hope we will have an opportunity to present those results at some future occasion.

**Q. Roughly how many lives are contained within each decile?**

TK: At age 65 (males) we have about 20,000 - 30,000 lives in each decile. Combined, for ages 40-89 (males) in 2015, we have between 1.0 million and 1.5 million per decile, with generally more lives in the less deprived areas.

**Q. Can we look more closely at London? I imagine the mortality rate across the capital exhibits varied socio-economic characteristics compared to the rest of the UK**

TK: In our current research on the impact of individual components (income …) on mortality we can take the "London-effect" into account. For the research based on IMD deciles this is not possible, since all geographic information is lost once the LSOA's are ordered according to their IMD score.

AC: London has experienced faster rates of improvement since 2001. We are currently investigating what the reasons for this are. It might be higher GDP growth, better improvements in healthcare than elsewhere, or something else.

**Q. Is there any evidence that the slowdown in mortality is also widening the gap between the most and least deprived or narrowing it?**

TK: The evidence so far suggests that the gap is widening. But I cannot say, whether this is because of the slowdown or has other reasons.

**Q. Why were Cause and Diagnosis not available in the more recent dataset? Has the CMIB got worse at collecting data?**

GS: The CMI asked for relevant information in their surveys. However, the response was either low or of inadequate quality for the data to be reliable.

**Q. Cancers are diagnosed at different "Stages of Severity". So, are there different Morbidity rates for different stages?**

GS: The ONS morbidity data do not contain "severity" information - therefore our modelling does not allow for different cancer stages. This has an impact to the comparison with the insured-population rates, as currently our comparison is not 100% like-for-like. To some extent we are mitigating this (and planning to do more so) by excluding certain cancers from the general population rates.

**Q. Some of this will be to do with product terms, underwriting over time, policy holder awareness**

GS: These are all possible factors. Unfortunately, they are not straightforward to identify or quantify for our modelling purposes.

**Q. Given common references to the "NHS postcode lottery" should geographical location be a key risk factor?**

GS: I believe there are differences in cancer treatment and mortality due to geographical location. However, I think it's less clear if this will be a risk factor for cancer incidence - in either the general or the insured population. We have very recently obtained ONS data related to incidence by geographical region and we are planning to extend our analysis to include this.

**Q. You say cancer rates are lower for insured population but I think the converse is true for the developing countries; cancer tends to be a lifestyle disease here**

GS: This could be well true for different countries. We have only analysed UK data and our findings cannot be generalised to extend to all parts of the world. Certain cancers are linked to lifestyle, but not all (e.g. breast cancer etc.)

**Q. How much in your opinion have medical advances in detecting cancers and diseases contributed to the increasing incidence trend?**

GS: This has very likely been an important factor, as many diseases are easier to detect - and also more likely to detect at earlier stages and younger age. It is though a factor that is not straightforward to quantify. We have not included it in our current analysis, but is a theme we want to explore.

**Q. Could the lower rate explained with the effect of selection by the company?**

GS: There could be a "company selection" effect. I think however, that this should drive rates down with time - while what our analysis shows is the opposite. So, there must be other factors contributing to the increasing trend of rates.

**Q. Is medical underwriting not a reason for lower claim incidence in insured population?**

GS: This could be a factor for certain causes, including for example heart attack. It is less clear though if that would be the case for cancer (which caused about half of the claims in our data).

**Q. Do you have any view on how CI morbidity rates have changed since 2010?**

GS: We have not (yet) seen any claims data beyond 2010, so I would not want to speculate on this by extrapolating our current model (which shows increased rates up to 2010). A new strand of our work concerns building models that can be more suitable for projection beyond the observed rates.