Contribution to Faculty of Actuaries Sessional Meeting on 15th March 2010.

As a specialist in longevity risk my comments naturally lean towards that part of the paper. This is not to ignore the other sections — on the contrary, as a non-specialist in investment and regulatory matters I valued the authors' comments on asset matters and the detail on Solvency II. In particular I noted with wry amusement in ¶5.5.3.2 that CEIOPS "recommended the use of government yields as providing the risk-free rate". But which government? Greek government ten-year bonds yielded 6.04% last week, whereas equivalent bonds from the German government yielded 3.15%, despite being denominated in the same currency (Economist, 2010). The market for Greek government debt is much smaller and more thinly traded, so part of the extra yield may be due to that much-discussed liquidity premium. Should sovereign debt really be regarded as risk-free? The question is not academic for U.K. annuity writers — the U.K. government may have a lower relative outstanding debt of longer maturity, but its budget deficit of 14.0% is much higher than the Greek one of 9.5% (Economist, 2010).

The authors clearly show that running an annuities business has got a lot harder in the past decade. As covered in ¶2.7.1, important changes have been driven by customer behaviour: more people are phasing their retirement and the increased frequency with which people change jobs has led to more fragmented pension pots at retirement. As a result, the annuity purchase price has become less reliable as a proxy for socio-economic status, and therefore longevity. In response insurers have become much more sophisticated in their underwriting of individual longevity risk, using methods such as those described in Richards (2008). The past few years have seen a veritable explosion in the number of risk factors used by insurers. As touched on in ¶3.2.3.3, the power of the postcode as an underwriting factor has quickly turned sceptics into advocates.

In ¶3.3.4 the authors talk of a reduction in credibility if the number of risk factors is increased. However, this is only true if one splits the data set to fit a mortality model. If one uses the entire data set in an single, overarching statistical model, then there is no such loss of credibility. On the contrary, the phenomenon of *enhancement* often applies — adding a new risk factor in a model can increase the explanatory power of the *existing* risk factors. This important feature of multivariate modelling is covered in detail by Currie and Korabinski (1984), and I have found this "virtuous circle" to be the rule in modelling annuitant mortality.

If the players in a market have varying degrees of sophistication in their underwriting, market-driven selection means the insurer with the least sophisticated basis is left with underpriced risks. This was described as "winner's curse" by Ainslie (2000), and means that successful annuity writers have to use techniques which squeeze the greatest value out of their experience data. A life office which merely compares experience against q_x from a standard table will lose out to those offices using parametric survival models, for example.

The rise of the impaired-annuity market has created another source of anti-selection. Those who qualify for enhanced rates due to some medical condition would have been in the "standard" pool a decade ago. Measuring the strength of anti-selection in the open market is challenging, but it has the potential to wipe out the profit margin of any annuity writer who ignores it. As the authors note in ¶3.3.1, enhanced annuities have larger fund sizes on average than the rest of the market. This raises the obvious question of how to tease apart the roles of socio-economic status and selection. Again, this can only be sensibly done with a statistical model.

The less obvious flip side of the impaired-annuity market is risk for the writers of those impaired annuities. Most impaired portfolios contain a large proportion of liabilities to people with a handful of specific conditions, such as diabetes and hypertension. Impaired-life annuity portfolios are therefore particularly vulnerable to a breakthrough improvement in medical treatment for one of those conditions.

Although the individual-annuity market is overwhelmingly dominated by pension annuities, I found it useful that the authors also covered purchased-life annuities and immediate-needs annuities. My only comment on the latter is that life expectancies tend to be much shorter than "below 10 years" as cited in ¶3.4.1. I find the life expectancy for an immediate-needs annuity is typically under 2.5 years.

I was pleased to see the considerable attention shown to basis risk in ¶3.7.3 and elsewhere. This is particularly important in the area of mortality projections, where few portfolios have either the scale of data or the historic time series to parameterise a projection model. Richards and Currie (2009) questioned the suitability of the CMI "assured lives" data set for annuity purposes, which leaves most practitioners using population data. However, annuitants are a select subset of the wider population, and annuity liabilities are even more concentrated still — Richards (2008) showed that half of all annuity liabilities are often payable to just 10% of lives. Insurers and reinsurers of annuity risks are rightly wary of basis risk, which has implications for all methods of mortality projection. It is a particular issue for projecting mortality by cause of death — Figure A shows the strong link between cause of death and deprivation score for some major causes of death. These relationships are not constant across all causes of death either, as shown in Figure B. Crudely put, the people forming the bulk of your annuity liabilities do not die of the same causes of death as the wider population. The relative proportions by cause of death in the wider population are not necessarily applicable to annuity liabilities.

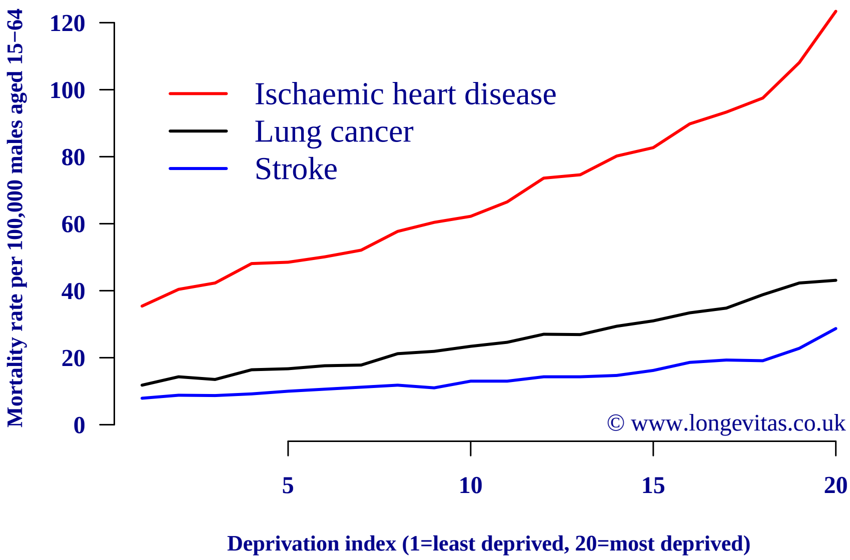

Figure A. Mortality rates by deprivation index for selected major causes of death. The lives who account for the largest proportion of liabilities have different relative causes of death than the wider population. Source: ONS data for males aged 15-64 in England and Wales.

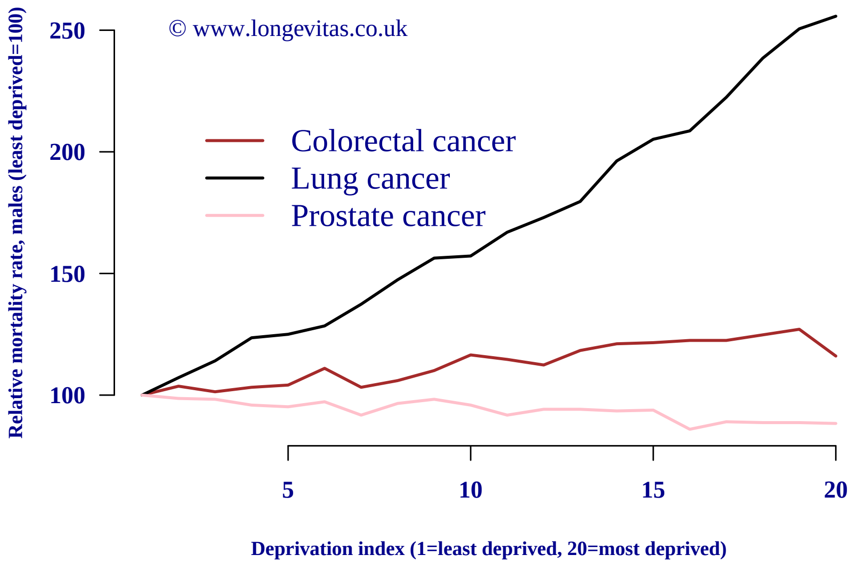

Figure B. Relative mortality rates by deprivation index for selected major cancers. There is no simple relationship between cause incidence and deprivation index: lung-cancer rates rise sharply with deprivation, whereas prostate-cancer rates fall slightly. Projections based on extrapolating rates by cause of death in the population may be misleading for annuity liabilities. Source: ONS data for males of all ages in England and Wales.

In Appendix A the authors showed that the technical provision calculated using the best-estimate mortality assumption was only 0.21% different from that calculated using the Monte Carlo simulations. While it is generally true that these values are similar, an important subsidiary point is that the explicit Monte Carlo simulations usually produce a marginally higher value. Although the difference is relatively small, a regulator might prefer the explicit Monte Carlo simulations. The authors also talk about using model points in ¶7.2.2.5, although full-portfolio simulations are now easily within reach for even the largest portfolio. Even for a large portfolio it only takes an hour to do 10,000 run-off simulations with stochastic trend risk (Richards and Currie, 2009).

References

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