

GUEST EDITORIAL

Ancient or Modern?

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Actuarial Science is an interesting discipline because it is, by its very nature, interdisciplinary. In fact, you could argue that it is defined by an intersection between a whole set of more fundamental disciplines, including finance, probability, statistics, mathematics and management. This throws up some unique challenges for actuaries when seeking to develop new and innovative approaches to current actuarial problems. Should the starting point be within the subject, or should we be looking to other areas first? Should we start with the old ways of doing things and look to develop these (the “Ancient”) or should we throw all this out and start again with a completely fresh approach (the “Modern”)?

Whenever things go wrong, there is a tendency to question whether the whole approach that has been used is wrong. Sometimes, it is clear that this is the case: for example, in the recent banking crisis which has been the subject of much analysis (see, for example, Donnelly & Embrechts, 2010, and the references cited in that paper). A mature profession will continually question itself about the methods and approaches it uses, in the constant quest to do better. It is also likely to be questioned from outside if the consequences of perceived failures affect people more widely. A good example of this is the review of the UK actuarial profession (Morris, 2005) which was commissioned by the UK government in direct response to the financial crisis at Equitable Life. The Morris review was wide-ranging with a number of recommendations directly relevant to the problems at Equitable Life. However, it also raised a number of issues which have implications for the way in which the actuarial profession interacts with the academic community (in the widest sense). This included recommendations for the education of actuaries and the appropriate input from other disciplines. The main thrust of the review in this area was that

the profession has been too insular, with insufficient contact with other professions and too narrow a professional training, and has been slow to adopt new approaches and techniques. This has resulted in useful inputs from the disciplines of economics, statistics and demography, to name only some, having less impact than they should.

The Morris review goes on to say that the profession should ensure that its examinations’ syllabus was “influenced appropriately by developments in academic actuarial science and in other disciplines and professions, in order to avoid the rather insular approach that was the subject of criticism in the past”. It is clear that the view was that the profession had become too reliant on its own work and had paid insufficient attention to what was happening elsewhere. Since the review was published, there has been considerable progress and the profession has made some notable efforts to encourage more interactions between actuarial and other disciplines. As just one example of this, the Actuarial Profession commissioned interdisciplinary research projects in mortality/longevity/morbidity in 2010. However, to return to my original question: is direct input from

outside the profession always better than what is already being developed by those working within the area? The Morris review commented that there was

an often repeated concern, that there is insufficient transparency in actuarial advice. For quite some time, if less so recently, many have regarded actuarial advice as having the characteristics of 'black box' analysis with the methodology and calculations lying behind the outputs and even the input assumptions being quite opaque.

There is a danger that when frustrations arise with current actuarial methods, something proposed from a different discipline can seem attractive and be presented as having all the answers that current methodology cannot supply. While new approaches can lead to more extensive interactions between the actuarial profession and other disciplines, there is a danger that this could lead to the use of “black box” approaches that are even less transparent and which were singled out for criticism in the Morris review.

One way in which these types of problems could be overcome is for researchers from other disciplines to read and understand the existing actuarial literature (both professional and academic) when considering how they could make a contribution. This would be beneficial both to the actuarial profession and to the researcher: the profession would benefit from something that was directly related to their work, and the researcher would have a greater chance of influencing current practice. I will give an example from my own research area to illustrate this in more detail, but there is another related topic which should also be mentioned first. This is the question of how widely read the actuarial journals are within the profession itself. If all researchers making contributions to the actuarial literature should relate their work to previous contributions, then it should also be the case that actuaries should have a reasonable knowledge of current developments within their own areas of expertise. This would enable a balanced view to be taken about whether it is better to use an approach from within the area, or whether a completely fresh and different method is needed. However, it is difficult for a practitioner to have a reasonably good knowledge of current developments in their own area. This is sometimes due to lack of sufficient effort on their own part, but it is also often due to the difficulty of writing a paper which is both academically rigorous but also immediately understandable. There are some papers which appear to be quite generally known by actuaries to whom they are directly relevant. A good example of this is one of my own papers with Peter England (England & Verrall, 2002), which was deliberately written in order to be as easy as possible to follow. And yet there are other papers which are probably more important, but which are much less well known. As examples of this from the same field as England & Verrall (2002), I would cite Bühlmann *et al.* (1980) or Norberg (1993). How many people working in the profession who have read England & Verrall (2002) have also heard of these two papers? And yet I would argue that these two papers will probably be more influential over future developments that are actually used in practice than anything written in other disciplines. In fact, I would also argue that it is essential for any interdisciplinary research to begin with these papers, written in the actuarial literature *before* making any proposals for improvements.

These papers are all concerned with an area of non-life insurance that is of great importance for solvency and capital modelling, which is the prediction of outstanding claims. I would like to illustrate my original questions about “Ancient or Modern” by considering a classic example of an actuarial technique which has gained widespread use, but which is often criticised. This is the chain-ladder technique, which is an extremely simple way to predict outstanding claims. It uses historical claims data, aggregated (usually) by year. The first problem is it uses data which have been

aggregated, which means that there is a loss of information. Denoting cumulative data from origin year i which has j years delay by C_{ij} , the basic model is

$$C_{ij} = \lambda_j C_{i,j-1}$$

λ_j is called a “development factor” and once these have been estimated, it is straightforward to project claims forward. Thus, the chain-ladder technique is very simple to apply and understand. However, it is very far from being perfect and some would go further to argue that it is inappropriate. Therefore, when looking for ways to improve on something in fairly widespread use, should the profession look outside for an alternative reserving method or should it start from what is already known and develop that? The danger of the former approach is that a completely new method will be suggested using modern techniques that are completely unrelated to existing practice. This would then be difficult to adopt in practice, because the practitioner who relies on the method is likely to say that they need to be able to justify and explain what is being done. They are also likely to want to use their professional judgement to influence the outcome, and will soon revert back to the tried-and-tested techniques. In other words, they will prefer to use the (imperfect) chain-ladder technique because they can understand the development factors and use them in a way which they believe they can justify and which the regulators and company management will accept and understand.

My own approach to this has been to work on the well-known methods such as the chain-ladder technique as a first step. Once this first step has been established and it clear how this relates to the existing method, then it is possible to suggest new approaches which may end up being considerable advances on the original method. The advantage of this approach is that the new approaches avoid the “black-box” failings and they provide a degree of reassurance in that they can be explained in terms of what has been done previously. In other words, I have tried to build something Modern out of the Ancient methods. My most recent papers (such as Verrall *et al.*, 2010) have gone back to the very basic processes (as set out in Bühlmann *et al.*, 1980, and Norberg, 1993) and developed a model which can (if this is the limit of the ambition) reproduce the estimates produced by the chain-ladder technique. However, these recent papers can also provide a great deal more information, enhance the understanding of the process generating data, and help the actuary develop new methods in an evolutionary way.

So what is the answer to the question of whether Ancient or Modern is the best way forward? It is clearly not the case that new actuarial methods can only be developed by those working in the industry or associated academics. However, there is a very clear imperative on anyone who wants to influence actuarial practice to understand what has gone before and relate whatever new methods they think could be improvements to the way actuaries currently think. There are many significant advances being published in excellent journals, such as the one you are now reading. Those of us writing papers for these journals need to continue to try to relate research papers to what happens in practice, and to make it as accessible as possible. In that way, we will have the best of both worlds in this exciting interdisciplinary subject known as actuarial science.

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