

Actuarial modelling

Models are at the heart of many aspects of modern life – they are used to design buildings, forecast the weather and for countless other purposes. Perhaps most strikingly, they provide vital information to decision-makers in business and finance. Good models enable important decisions to be based on sound information. However, models can never reflect reality in all its complexity – as the saying goes, “All models are wrong; but some are useful.” Unfortunately, it’s the mistakes in models that get the publicity, rather than the countless successes.

The most notorious mistake is probably the Columbia space shuttle disaster, which happened because chunks of debris fell off the rocket launchers during lift-off and damaged some heat shield tiles, thereby condemning the shuttle to destruction when it re-entered the earth’s atmosphere. The disaster happened in spite of engineers having created and run models to assess this threat. The flaw was that the engineers did not envisage, and so did not put into their model, the possibility of any one chunk of debris being as heavy as one kilogram.

Flaws in models have also been implicated in a number of financial and business failures, notably that of Long Term Capital Management in 1998. More recently, it has emerged that, in the build-up to the current credit crunch, flawed models played a key role in the erroneous attribution of top credit ratings to many mortgage-backed securities.

Luckily, serious flaws in models aren’t inevitable. Admittedly, in any real-life problem being analysed there are always going to be “unknown unknowns” that will only manifest themselves when the future events being modelled actually happen. But models, if developed and used with care, are nevertheless invaluable, as they permit the relatively rapid consideration of a wider range of variables than the human mind alone is capable of.

Modelling is particularly useful in actuarial practice, helping life insurers to arrive at the likely mortality rates of their customers, car insurers to work out claim probabilities by rating factors and pension fund trustees to estimate the contributions and investments they will need to meet their future liabilities.

The Board for Actuarial Standards, set up three years ago, is developing a comprehensive set of technical actuarial standards for use in the UK. The overall purpose of these standards is to ensure that users of actuarial information – such as insurance company executives and pension fund trustees – can place a high degree of reliance on its relevance, transparency of assumptions, completeness and comprehensibility.

In pursuit of this outcome the BAS is developing, among others, a generic standard on modelling. Indeed, it is difficult to think of a more important standard. Precisely because the potential consequences of a flawed model can be so great, it is vital that users of the output from modelling should have a clear understanding of the power

of the model that has been used and its limitations so that they are in a position to make a judgment on how much to rely on it.

The BAS has now published a consultation paper on what it thinks the modelling standard should contain. It starts with a number of general principles and goes on to cover what should be modelled, the assumptions and data that should be used, and the checking of models in order to test their strengths and reveal their limitations. Most of the discussion is applicable to all models, not just those used in actuarial work, and the BAS is inviting responses from all who are interested in the development and use of models, whether actuarial or not.