

Book Review

Ralf Korn, Elke Korn and Gerald Kroisandt, *Monte Carlo Methods and Models in Finance and Insurance*, CRC Press, 2010, 470pp. (hardback), £57.99 (\$89.95). ISBN: 9781420076189

This book is a comprehensive canter through the various Monte Carlo methods and their application in numerous financial models before rounding off with a high level assessment of their role within the insurance industry. The book covers a wide range of methods and models from old favourites like the Black-Scholes model to recent developments such as the multilevel Monte Carlo method.

The book starts off with a detailed discussion of the process of generating, testing and analysing random numbers which are a critical building block of any Monte Carlo method. This chapter covers a wide range of different random number generators, ranging from simple univariate linear generators to complex quasi-random sequences such as sobol numbers. Quasi-random sequences all appear a dark art to me so I must admit to a certain disappointment to find out that they had not been given suitable names such “Voldemort sequences” or “Mordor numbers”.

This section was easy reading with the authors moving from the basic to the complex with sufficiently clear explanation to enable the reader to understand why the developments in methodology have been made. However, I would suggest that random number generation is so well researched and documented that, although this section made interesting reading, the 50 pages used by the authors in this area did not add to the book, and so these pages may have been better spent providing a more complete explanation of the methods discussed later in the book.

The authors then move on to Monte Carlo methods. This starts off with an overview of crude Monte Carlo simulation techniques. The authors then discuss the different variance reduction techniques available (e.g. control variates) for making simulation more efficient. The majority of the material in this section will not be news to those who have some experience of Monte Carlo methods and practical applications (e.g. Realistic Balance Sheet production).

The next four chapters cover stochastic processes and financial models, separately considering those processes and models which are continuous path based from those which are discontinuous path based. The authors have certainly not been afraid take on the challenge of trying to cover the full spectrum of models up to reasonably recent developments. However, throughout all these sections, the book becomes littered with various stochastic notations, not all of which are well defined, making the book quite difficult reading in places, particularly for those of us who struggle to remember Itô calculus and stochastic differential equations.

Offsetting this, the authors cleverly weave in example algorithms throughout the book which allows the user to mock up simple examples of the method. Indeed, it was like the authors were challenging the reader to try and build their own simulation model to see if they could generate similar results.

The final section of this book discussed Monte Carlo simulation in actuarial models. Here the authors tried to bind the theory in the earlier sections to current practical applications in the actuarial world.

The intention of the authors for trying to build bridges between the two worlds is to be commended. However, the authors tried to cover premium and risk measures, dynamic mortality models, copulas, general insurance with a final brief reference to Solvency II and asset liability management within this single chapter. Although this is an eminently readable and informative chapter, it could quite easily have been the subject of a book in its own right and so in places it did not perhaps have the depth of detail it warranted.

Overall, this was a good reference book which was comprehensive in its coverage of the methods and financial models available. The book certainly brought to my attention methods and applications I was unaware of with discussion of some very recent developments. However, the price to pay for such completeness in coverage of the methods and models was that the discussion of methodology was overly brief and formulaic in places with the reader being pointed to reference material for a more complete discussion. This made the book difficult to follow in places and left a feeling of incompleteness. The AA road-map tells you of the existence of towns and how to get there, but to appreciate their beauty (or otherwise) you need to visit the town. This book left me feeling like it was the road-map of Monte Carlo methods.

However, what stood out about the book for me (apart from the wide coverage) was the use of example algorithms and numbers by the authors. They have peppered the book with these example algorithms which gives the reader the chance to reinforce their knowledge of the techniques and start to gain comfort in using them.

Although the authors intended the book to be an “introduction to Monte Carlo methods and financial and actuarial models”, there is heavy reliance on stochastic notation which is not always clearly explained and so can make the book heavy going in places, particularly for novices to Monte Carlo methods and models. Therefore, I am not sure the book fully hits the mark of its intended audience. I suspect that the book will be of more use and interest to those who have some grounding in Monte Carlo methods and models, but are interested in understanding the wider range of methodology currently available or understanding the evolution of some of the new methods being introduced into the actuarial modelling world.

Neil Meldrum