Book Selection

Edited by U Aickelin

P Brandimarte: Numerical Methods in Finance and Economics: A MATLAB-based Introduction (Statistics in Practice) (Hardcover)

F Burstein and CW Holsapple (eds): Handbook on Decision Support Systems 1 & 2: Variations (International Handbooks on Information Systems)

YA Ozcan: Health Care Benchmarking and Performance Evaluation: An Assessment Using Data Envelopment Healthcare Benchmarking and Performance Evaluation: Analysis (DEA) (International Series in Operations Research & Management Science) (Hardcover)

S Brailsford and P Harper (eds): Operational Research for Health Policy, Making Better Decisions: Proceedings of the 31st Annual Conference of the European Working Group on Operational Research Applied to Health Services (Paperback)

Numerical Methods in Finance and Economics: A MATLAB-based Introduction (Statistics in Practice) (Hardcover)

P Brandimarte

Blackwell Publishing Ltd, 2007. 696pp. £55.75
ISBN: 0471745030

Bridging the gap between difficult theory and practical application offers significant challenges. In this new edition of 'Numerical Methods in Finance and Economics' Paolo Brandimarte sets himself this task. It is clear from the outset that the text is motivated by the author's belief that in the world of finance there is: a need for theory; a need for numerical methods; and, a need for numerical computing methods. In the wake of the current economic crisis this view is hard to dispute. One might add further that there is also a need for much deeper understanding. The text's achievement is that it offers the diligent reader this deeper understanding while building the confidence to apply the theory effectively. This is accomplished in an interesting and academically respectable manner. The technique of *inter alia* discussing the theory before illustrating its application, principally via the vehicle of MATLAB®, works extremely well. This approach has the further benefit of unlocking the power of the MATLAB® application to the reader.

Brandimarte's first objective is to develop the appropriate financial theory. Here he starts by considering the modelling of uncertainty in finance and then addresses basic financial assets, derivatives and asset pricing. He then moves on to the specifics of fixed income securities, stock portfolio optimization (utility theory utilizing the mean-variance portfolio approach) and risk management, alternative risk measures, fixed income securities, the dynamics of asset prices (in particular the Wiener process), derivatives pricing (including the Black-Scholes approach) and interest rate dynamics. A variety of MATLAB® functions are then used to illustrate the concepts introduced. These chapters are supported by an abundance of well-chosen and relevant references.

Brandimarte next turns his attention to numerical methods, beginning with the nature of numerical computation. The content then moves on to consider in some depth the solution of linear systems, numerical integration (including deterministic and Monte Carlo methods), finite difference methods for partial differentiation, the solution of non-linear equations, differential equations, bisection methods, convex optimization (including constrained, unconstrained optimization and linear programming). There are again numerous MATLAB® examples used to illustrate the concepts introduced, with appropriate references to support the theoretical discussion and the practical applications.

After these techniques have been mastered by the reader, they are further illustrated with some specific financial applications. The focus is on option pricing, which is explored using binomial lattices, trinomial lattices, Monte Carlo methods (including the generation hedging strategies using MATLAB® code) and concluding with examples using finite difference methods. This section is excellent and gives a most thorough coverage of option pricing.

Brandimarte next directs his considerable expertize to the consideration of advanced optimization models and methods. This section includes: dynamic programming, linear stochastic programming and non-convex optimization methods. Here Brandimarte chooses to use a tool other than MATLAB®, namely AMPL. The solvers CPLEX and MINOS are also illustrated. The examples are again clear and concise.

The text closes with a substantial Appendix, which contains: an introduction to the MATLAB® environment and a guide to MATLAB® programming; a refresher in probability and stochastic processes; and, a brief but lucid introduction to AMPL.

This is a difficult but extremely rewarding book. I found the chapters on theory clear and concise. The accompanying practical examples using MATLAB® are appropriate and

generally easy to follow. I tried a variety of these on both a MacBook Pro and a PC running Windows XP. They all ran successfully.

As I indicated at the beginning of this review, it is unusual to find a text successfully combining difficult theory with its application in an accessible environment. Brandimarte has produced a real gem of a book, which does precisely what he sets out to do. I cannot recommend the book too highly. It is also worth noting that as a residual he has shown how effective the MATLAB® environment is for the application of numerical methods to finance and economics. The reader cannot fail to be attracted to trying these techniques out, with significant reward.

The text will be particularly usefully for advanced undergraduates and postgraduates studying a module in finance. It will also be enlightening for those active in the financial markets. The text is without doubt the best I have seen in bridging the gap between financial theory and computational practice.

Kingston Business School   S Fitz-Gerald

Handbook on Decision Support Systems 1 & 2: Variations (International Handbooks on Information Systems)

F Burstein and CW Holsapple (eds)

Springer, 2008. 800pp. + 854pp. £138.50 each
ISBN: 3540487158; 3540487123

This is a substantial work, totalling over 1600 pages and utilizing over 130 researchers or practitioners contributing across 71 chapters. It is divided into two discrete volumes, respectively entitled 'Basic Themes' and 'Variations', but for a review it is sensible to take them together as one 'book'. Each of the 71 chapters is an independent article on some aspect of Decision Support Systems (DSS). The basic philosophy of the book is, reasonably, that DSS is a diverse and advancing core element of the Information Systems (IS) field.

Overall, the content of the 71 contributions does reflect the indication given in the Preface: that the book addresses 'foundations, ... thoughts, ... experiences, ... current developments, ... Trends'. With the number of authors and range of individual topics, there is an inevitable variation in writing style and quality, but in general I found the contributions well constructed and readable. Approaching 100 of the 130+ contributors are based in the US, which may have some bearing on the overall perspective.

Commendably, the DSS focus of the Handbook is well maintained and it resists the temptation to stray. Equally commendably however, it pursues diverse dimensions and perspectives to DSS. In the space available here, this review can do no more than illustrate the extensive coverage and consider the broad picture. The book includes the more obvious areas, such as DSS types and architecture, history, data warehousing and mining, on-line analytical processing, Group DSS, and Knowledge Management plus a number of case studies. It also includes aspects less commonly discussed in DSS books, such as creativity support, failure, portfolio planning, and information visualization. It does not neglect human-oriented elements of DSS and decision making.

Although a strength of the book is that it pursues its mission in an eclectic manner, there are a few weaknesses regarding its balance. Readers of this journal might well consider that the classical models and soft-systems approaches of Operational Research (OR) are somewhat neglected. Early chapters/articles of the book rightly note that quantitative models have long been an essential element of DSS and that, in general, they are an integral part. Nevertheless, the Handbook is weak in this direction, being limited to little more than a brief discussion of quantitative techniques in a chapter on model management and solvers. Having said that, other chapters do specifically discuss multi-criteria decision making, neural networks and data-mining approaches. However, the omission of a specific chapter on OR techniques and their relation to decision structure is surprising. Soft systems perspectives are limited to sense making.

The potential group role of DSS is recognized, but a fuller treatment of the computer supported co-operative work (CSCW) aspect would have been worthwhile. The other dimension in which the book is surprisingly light is that of IS strategy, given its philosophy that DSS is a core element of IS. In both these fields there is considerable research and literature to draw on. However, by the same token perhaps, libraries likely to acquire the book may well be already well stocked with OR, IS strategy, and CSCW material.

The book rightly includes Business Intelligence (BI) viewed as a data-driven DSS, rather than as some distinct contiguous paradigm. However, it misses the opportunity to broaden the BI picture by more fully taking advantage of DSS. The overview of BI presented covers the current conventional scope, but discussing a wider potential contribution to the 'intelligence' of BI would have been a valuable perspective.

However, the criticisms above should be seen in perspective. This is a broad ranging Handbook which could be very usefully employed in support of DSS teaching and research across a range of undergraduate or postgraduate academic programmes. Unsurprisingly given its size, it is somewhat pricey and not, clearly, intended or appropriate as a course text book (nor for any but larger business/industrial teams) but it should be a valuable addition to the material available to back-up such research/teaching.

Overall, a distinctive and worthwhile addition to DSS resources.

Bournemouth University Business School   B Hollocks

Health Care Benchmarking and Performance Evaluation: An Assessment Using Data Envelopment Healthcare Benchmarking and Performance Evaluation: Analysis (DEA) (International Series in Operations Research & Management Science) (Hardcover)

YA Ozcan

Professor Ozcan's text will, I believe, provide a valuable text for performance analysts in the health sector wanting to expand their knowledge of alternative approaches; as well as for data envelopment analysis (DEA) experts wanting to apply their skills in the health sector.

I should say up front that I have always been a bit sceptical of the value of DEA in assessing performance in the health sector (due to the issue of variable data quality and also the problem of measuring output appropriately). Nevertheless, I found this a very useful text laying out how one might use the DEA approach. I also found much useful discussion of how one can conceptualize and measure productivity for a range of organizations.

The book sets out to describe the use of the DEA approach to health for 'graduate students' and 'practicing administrators'. Although the latter audience seems a bit ambitious (in the UK at least), it meets the needs of the former audience well and actually goes somewhat beyond its primary aim by providing useful discussion of how productivity can be modelled and measured in the health care arena.

The first of the two sections (Part I Methods) starts with an overview of the techniques that can be used to investigate productivity in health care (simple ratios, regression, and stochastic frontier analysis). This identifies some of the strengths and weaknesses of approaches but tends to concentrate on the intellectual aspects rather than the pragmatic issues such as the robustness with less than perfect data quality and the ease in explaining the approach to managers.

The text then gives a clear introduction to the use of DEA in the analysis of performance. It is not intended to be a mathematical treatise ('reduce anxiety for complex mathematics') and explains most of the theory in conceptual terms with just a small amount of mathematics laying out the linear programming (LP) formulations. Occasionally the notation could have been clearer and, for me, the appendices were all too brief to satisfy my need to revise the mathematical underpinnings of the theory. But nevertheless the exposition is largely clear.

Using an incremental approach, starting from simple input-output models, the text builds up the discussion of input *versus* output orientation, and constant *versus* variable returns to scale; to more advanced topics such as the weighted restricted models and longitudinal analyses.

It was the second section (Part II Applications) that I found to be particularly valuable. The focus of this section is very much on how the productivity approach can be applied to various 'cuts' of the healthcare system including: organizations, disease pathways, and patient groups. In each of the studies there is a clear discussion of what constitute the inputs and outputs, and then how the DEA model can be built to reflect this.

If I have a minor criticism of the book it is around the discussion of quality. Two options for including quality are discussed: an additive approach in which quality is an additional output alongside the other (volume) measures; and a two-stage approach in which quality is analysed separately. I found neither of these very satisfactory and was surprised that there was no discussion of using quality measures to amplify/attenuate the (volume) output. Although this might not have presented new challenges in how DEA models are used, it would have been a useful addition to the use of book in the broad discussion of measuring productivity.

The software provided (an Excel add-in developed by Professor Zuo) was easy to install and, though a somewhat reduced version, was enough to understand the relatively modest examples which are used throughout the text. I would imagine that the full version of the software would be a useful tool for pursuing real-life DEA studies.

Overall, this is a good text and I would recommend experienced and developing performance analysts to use it in order to add DEA approaches to their range of tools. Personally, I am sure that I will use the text when I need to include DEA approaches in my work.

Department of Health   S Peck

Operational Research for Health Policy, Making Better Decisions: Proceedings of the 31st Annual Conference of the European Working Group on Operational Research Applied to Health Services (Paperback)

S Brailsford and P Harper (eds)

The 31st Annual Conference of the European Working Group on Operational Research (OR) Applied to Health Services was held at the University of Southampton, in the UK, in the summer of 2005. This book collects together 18 papers from this conference in handy paperback form, divided into five sections, and supported by details of the authors and other conference participants.

Seven papers comprise the Health Service Planning Models section. Most address the application of simulation modelling to hospitals in the UK and overseas, though one addresses the use of problem structuring methods in helping develop community health services. Simulation modelling in general, and particularly of the more well-defined parts of a hospital such as outpatients and the Accident and Emergency Department, figures strongly in this book. Indeed, a later paper

suggests that this may be because these are not only the areas in which most interfaces between the public and the health-care system take place, but the ones in which performance problems are most visible and newsworthy.

There are four papers in the Optimising the Use of Resources section, covering topics as diverse as ambulance services in Sweden, the assignment of outpatient examination rooms (in which the tone is lightened somewhat by the names of the medical staff represented in the simulation—Dr Young of Paediatrics and Dr Old of Geriatrics are two of the more printable ones), the optimization of operating theatres and the scheduling of nursing staff.

The Performance Measurement section consist of three papers. One addresses the use of simulation modelling in healthcare, and includes a review of recent relevant journal and conference papers and a summary of commercially available simulation software. The other two papers cover the use of DEA in Brazil and in the Czech Republic.

Patient choice is a topic that has become increasingly discussed in the press in recent years, so it is perhaps somewhat surprising that the Patient Issues section has but a single paper, which is something of a reflection on how OR could help address issues of choice in healthcare.

The final section of the book considers the use of OR techniques in Disease Modelling, where the management of cancer patients and those afflicted by strokes are considered. The final paper addresses another highly visible and emotive topic—the incidence of wound infections following surgery.

With 18 papers covering a wide range of techniques and aspects of the healthcare system, the editors clearly had a substantial job to do. Their editing has succeeded in making this volume flow more like a book than a disjointed series of conference papers. In particular the common look of the papers helps with visually integrating the words. All is not perfect however—a few of the graphs no doubt looked clear when projected in colour onto a large screen, but shrinking them to the size of half a postcard and printing them in black and white makes interpretation of the data they convey rather tricky. A brief introductory chapter that placed the various papers in context would have helped the reader understand the structure and flow of the book—as it is the papers are simply allocated to one of the five sections with no additional support.

These quibbles aside, I can recommend this book to a number of audiences. As an A5-sized compendium this is a very convenient and accessible overview of how OR has recently been used across a wide part of the healthcare domain. I would certainly commend it to practitioners wishing to get a picture of areas of research, and to academic staff and students who are seeking a collection of real-world applications of various techniques.

QinetiQ Ltd   B Spedding