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Social Choice With Partial Knowledge of Treatment Response.

Charles F. MANSKI. Princeton, NJ: Princeton University Press, 2005. ISBN 0-691-12153-2. vii + 118 pp. $42.00.

Book reviews rarely discuss the preface of a book. But in this case, it is Manski's comment in the second paragraph of the Preface that sets the stage for this book. Namely, he claims that the line of research presented in the book is "barely beyond its infancy." This comment serves to remind the reader both of the importance of the topic and the opportunities that exist in this field.

The book begins by clarifying the general problem to be explored. The primary construct is that of a social planner asked to choose a treatment rule for a population that maximizes a utilitarian social welfare function. Individuals in the population respond differently to different treatments, based on observable covariates. With complete knowledge, this problem has a straightforward solution; Manski complicates the problem by noting that a social planner can rarely observe all of the covariates for all individuals in the population. Manski's planner is limited to experimental or study results that indicate which covariates affect the outcomes and the prevalence of those covariates in the population.

The central dilemma faced by this social planner is the so-called "selection problem." Simply put, it is impossible to know with certainty how an individual would respond to treatments not given. Given this ambiguity, Manski explores three potential choice rules: Bayes rule, maximin criterion, and minimax-regret criterion. The bounds on social welfare of each of these choice rules are explored, and with the help of certain defensible assumptions, solutions are found for the social planner's problem.

The social planner's problem is made more difficult by the planner's need to make decisions regarding a population for which the distribution of the important covariates is unknown and only a sample of the population is used to estimate the prevalence of the covariates. Here Manski uses and extends the statistical decision theory developed by Wald (1950) to handle the differences in information available to the social planner, such as differing interpretation of results of simple or stratified random sampling.

Finally, Manski combines the issues raised with the selection problem and the use of sample data. This combination is more of a problem posed than a solution offered (which ties back to the Preface). Providing theoretically correct and practically useful solutions to a social planner's problem in this context remains largely an open question, which provides a significant opportunity to the interested researcher.

The book's strength lies in its complete presentation, up to this point, of the research in this area, and identification of the central areas of the problem (selection and sample data) that make the problem challenging. Most of the book is not original work, but numerous examples help illustrate the issues discussed. In addition, and perhaps most importantly, the book unites relevant research in a coherent and logical way that will serve interested researchers well.

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REFERENCE

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TELEGRAPHIC REVIEWS

Dependence in Probability and Statistics.

Patrice BERTAIL, Paul DOUKHAN, and Philippe SOULIER (eds.). New York: Springer, 2006. ISBN 0-387-31741-4. viii + 492 pp. $69.95 (P).

This book is a collection of articles on recent developments in probability and statistics for dependent data. The volume comprises three parts: weak dependence, strong dependence, and statistical estimation and applications. The first part comprises seven chapters, including new results in weak dependence for Markov chains and dynamical systems. Six chapters on the subject of strong dependence emphasize nonlinear processes and random fields. The last seven chapters deal with various estimation problems in time series with an emphasis on applications.

Many of the articles were presented at the conference Statistics for Dependent Data held in Paris/Malakoff by the Statistical Laboratory of CREST (Research Center in Economy and Statistics) on January 26–29, 2005. The editors, who were organizers of the conference, also solicited articles from specialists who were not participants. A few articles stress mathematical developments intended for researchers in the field, whereas some are general surveys aimed at motivating new researchers and generating new ideas and applications.

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Series Approximation Methods in Statistics (3rd ed.).

John E. KOLASSA. New York: Springer, 2006. ISBN 0-387-31409-1. ix + 218 pp. $59.95 (P).

In the Preface, the author mentions that he wrote the first edition of this monograph for an advanced graduate-level course, to provide students with an introduction to Edgeworth and saddlepoint approximations and related techniques. The text emphasizes lattice distributions, yet this material is positioned so that it can be omitted by readers without compromising their understanding of the core material.

The first and second editions, appearing in 1994 and 1997, were well received by those working in the challenging, mathematically demanding research areas of series approximations and asymptotics (see, e.g., Booth 1998). This third edition features an expanded collection of references, exercises, and applications. Results have been reconfigured to adhere to a more conventional "theorem/proof" format, which should make the material more tractable to some readers. Kolassa's updated text should continue to serve as a valuable resource for interested students and researchers on saddlepoint methods and Edgeworth expansions.

Joseph CAVANAUGH
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REFERENCE

Booth, J. G. (1998), Review of *Series Approximation Methods in Statistics*, by J. E. Kolassa, *Journal of the American Statistical Association*, 94, 343.

Invariant Probabilities of Markov–Feller Operators and Their Supports.

Radu ZAHAROPOL. Basel: Birkhäuser, 2005. ISBN 3-7643-7134-X. xii + 108 pp. $39.95 (P). Digital: $7.99.

This book examines Markov chains on locally compact separable metric spaces from an operator-theoretic perspective. Properties of a Markov–Feller Markov chain are deduced from two linear operators derived from the transition kernel; that is, invariant distributions and ergodic properties of Markov chains are studied using classical functional analysis and not probability theory. The exposition compliments the probabilistic approach taken, for example, by Meyn and Tweedie (1993). Given the appropriate background, this book is well worth reading for anyone interested in Markov chains on continuous state spaces.

Only a modest knowledge of locally compact separable spaces is needed to appreciate this book. As one may suspect, the Riesz representation theorem (which characterizes the dual space of the continuous functions that vanish at infinity on a locally compact separable metric space X as the space of finite measures on the Borel σ-field of X) is the key result on which the author bases his presentation. The approach of Rudin (1974) and Cohn (1980) to the Riesz representation theorem provides the necessary background.

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Rudin, W. (1974), *Real and Complex Analysis* (2nd ed.), New York: McGraw-Hill.

The Risks of Financial Institutions.

Mark CAREY and René M. STULZ (eds.). Chicago: University of Chicago Press, 2006. ISBN 0-226-09285-2. xi + 655 pp. $99.00.

Enterprise risk management is becoming an increasingly active field of research, with considerable potential for important applications. This volume contains several chapters on currently hot topics in the field, grouped into I, Market Risk, Risk Modeling, and Financial System Stability; II, Systemic Risk; III, Regulations; and IV, New Frontiers in Risk Measurement. The material included was presented at a conference held in Woodstock, Vermont, on October 22–23, 2004. The volume comprises 13 articles written by experts in the respective fields. Each article is commented on by a discussant and followed by a Discussion Summary. Because of this, the book goes well beyond the usual edited volume and presents a very readable overview of some of the main methodological and practical issues underlying modern risk management. I fully agree with the editors' comment that "the result is a volume that points a way forward to greater financial stability and better risk management of financial institutions."

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Numerical Methods in Finance and Economics: A MATLAB–Based Introduction (2nd ed.).

Paolo BRANDIMARTE. Hoboken, NJ: Wiley, 2006. ISBN 0-471-74503-0. xxiv + 669 pp. $115.00.

Computational finance, as a relatively young area of research, nowadays relies on a wide variety of well-developed tools and theories from many different areas of mathematics. This text (hereafter NMFE) provides a lively and comprehensible introduction to numerical option pricing and portfolio optimization by focusing on fundamental concepts and results. NMFE includes a large number of MATLAB examples, which guarantee undergraduate and masters' degree students, as well as practitioners with little background in numerical methods, a satisfactory hands-on approach from the beginning.

Even though this edition (the title is slightly changed from the first edition, Brandimarte 2001) has grown from about 400 to 669 pages, the large number of possible topics in computational finance still has required compromises. Interest rate derivatives are described only briefly, and rapidly growing areas such as credit derivatives, stochastic volatility, and Lévy models are not mentioned at all. On the numerical side, finite element methods are absent. But, NMFE provides a thorough and quite unique introduction to numerical methods for portfolio optimization (e.g., dynamic programming, convex and nonconvex optimization).

The book is divided into four main parts. Part I contains the first two chapters and introduces the fundamental financial theory including basic fixed-income securities, portfolio optimization, and equity derivatives in a Black–Scholes setting. Based on MATLAB's financial toolbox, the reader is introduced to some basic programming techniques.

The second part, divided into four chapters, introduces generic numerical tools. With great care and MATLAB examples, not only the uses, but also the most common shortcomings of these numerical methods are illustrated. For the mathematical background of the theory, the reader is often referred to more specialized sources. After an introduction of numerical basics (e.g., error propagation, interpolation), deterministic and Monte Carlo methods for numerical integration are described, including extensive coverage of variance reduction techniques and quasi-Monte Carlo methods. Basic finite difference schemes for partial differential equations are introduced, and in the last chapter of Part II, convex optimization is introduced in detail. Here MATLAB's optimization toolbox is used extensively.

Based on the results of Part II, in Part III the pricing of equity options is described and examples of Asian, barrier, and American contracts are given.

Part IV treats more advanced optimization methods and models. Dynamic programming and its relation to pricing American options by Monte Carlo methods is introduced, linear stochastic programming with recourse is applied to portfolio management, and nonconvex optimization is described, with a focus on mixed-integer programming.

Finally, NMFE contains three appendixes with basic introductions to MATLAB, probability theory, and optimization with AMPL (A Mathematical Programming Language), which is used in the last chapters of the book.

For students and practitioners with no programming background who are willing to tackle its almost 700 pages, NMFE provides a very broad and enjoyable introduction to computational finance. References to new developments (e.g., credit, Lévy models) are sometimes missing, however. The extensive treatment of optimization techniques is a unique feature for such an introductory book.

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REFERENCE

Brandimarte, P. (2001), *Numerical Methods in Finance: A MATLAB–Based Introduction*, New York: Wiley.

The Nature of Statistical Evidence.

Bill THOMPSON. New York: Springer, 2007. ISBN 978-0-387-40050-1. x + 150 pp. $49.95.

This book seeks to answer the question: "In what sense do statistical methods provide scientific evidence?" (p. ix). To accomplish this task, the book comprises three parts: scientific principles, interpretations of probability, and statistical inference. The author admits that "this book is not a complete discussion of statistical foundations" (p. 4), because his criticisms focus on Bayesian statistics and p values. The intended audience includes students, consultants, and researchers with a solid background in probability and mathematical statistics, experience using statistics in applied problems, and a willingness to question prevailing statistical methodology. Has the author raised valid criticisms and suggested possible remedies for assessing statistical evidence? Inquisitive statisticians may find this book an interesting read in which to put their theories and epistemology to the test. There is an appendix to help with the requisite logical reasoning.

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Introduction to Linear Regression Analysis (4th ed.).

Douglas C. MONTGOMERY, Elizabeth A. PECK, and G. Geoffrey VINING. Hoboken, NJ: Wiley, 2006. ISBN 0-471-75495-1. xvi + 612 pp. $119.00.

The topic of regression is taught at nearly every institution of higher learning, is used by almost all applied scientists, and is of interest to both theoreticians and practitioners alike. This text continues to be one of the better books on the market for those interested in learning about regression. The authors bring with them an important blend of practical experience as well as experience in the classroom. The authors are to be commended for not resting on the laurels of their numerous successes in the realm of authored textbooks. Each edition of this text, now in its fourth edition, has sought to stay fresh, with new examples and new illustrations of the latest in statistical software.

As with previous editions, topics are explained in an intuitive and understandable manner. Numerous instructor/student materials are available from Wiley; electronic data sets, complete solutions to all problems in the text, and Power Point slides to aid with lectures (instructors only). There is also a student solutions manual with solutions to almost all odd-numbered problems. Discussions are primarily matrix-based, and the material is suitable for upper-level undergraduates as well as master's-level graduate students.

The organization of this edition is almost identical to that of the 3rd edition. The most noticeable changes include a more expansive coverage of nonlinear regression models and generalized linear models, a short appendix (9 pp.) devoted to the basics of SAS programming, and a comprehensive case study illustrating model building and variable selection. The instructor wishing to use SAS as a basis for teaching regression will need to use supplemental materials, because the appendix is too short to provide a good foundation. A suitable companion could be the text by Littell, Stroup, and Freund (2002).

The first 10 chapters form the basis of a solid course in regression, covering the following topics: 1, introduction to applications of regression; 2, detailed coverage of simple linear regression; 3, foundations of multiple regression; 4, model adequacy; 5, transformations and weighting to correct for model inadequacies; 6, diagnostics for leverage and influence; 7, polynomial regression models; 8, indicator variables; 9, variable selection and model building; and 10, validation of regression models.

The last five chapters include material on multicollinearity, robust regression, an introduction to nonlinear regression, and, finally, a solid introduction to generalized linear models. Miscellaneous topics are sprinkled throughout the final chapter, including bootstrapping, classification and regression trees, measurement errors, and neural networks. As with previous editions, the authors have produced a leading textbook on regression.

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Littell, R. C., Stroup, W. S., and Freund, R. J. (2002), *SAS for Linear Models* (4th ed.), Cary, NC: SAS Institute.

Models for Discrete Data (rev. ed.).

Daniel ZELTERMAN. New York: Oxford University Press, 2006. ISBN 0-19-856701-4. x + 285 pp. $94.50.

The revised edition of Daniel Zelterman's *Models for Discrete Data* is a 2006 update of a text that first appeared in 1999. Early in the introductory chapter, the author puts forward his view that unlike linear models, the methodology of discrete data analysis lacks a central core of topics that are essential to any course on the subject. Nevertheless, he presents a treatment of the topics that many statisticians would agree belong to such a core: sampling distributions for discrete data (e.g., the Poisson, hypergeometric, binomial and multinomial distributions are discussed in Chap. 2), logistic regression (Chap. 3), and log-linear models (Chaps. 4 and 5).

In addition, however, Zelterman makes his point that discrete data analysis is a diverse field, and that a less-than-encyclopedic treatment must necessarily be somewhat selective, by including a variety of less commonly covered topics. In particular, Chapter 2 contains material on the negative binomial and negative multinomial distributions, as well as three extensions of the hypergeometric distribution. Zelterman describes how the various hypergeometric distributions are useful for exact hypothesis testing in contingency tables and for power and sample size calculations for such tests. Also unusual is a section in Chapter 4 on conditions for the existence of closed form maximum likelihood estimators in the log-linear model and a chapter-length reexamination of the log-linear model from a coordinate free perspective (Chap. 5). Both of these topics are fairly theoretical and require more mathematic sophistication of the reader than most of the rest of the book. In this sense they are a bit out of place in this applications-oriented text, where much of the material (e.g., on logistic regression and loglinear models in Chaps. 3 and 4) is presented through examples, with theoretical aspects often relegated to the exercises.

Chapter 6, the final chapter, contains relatively brief discussions of additional topics, including longitudinal discrete data, case-control studies, Cressie–Read (i.e., power divergence) goodness-of-fit statistics, and the challenges associated with the analysis of sparse or high-dimensional discrete data. The section on longitudinal data is superficial and curious in the sense that it describes only marginal and transitional models as the "two main approaches to the analysis of longitudinal data" (p. 225), with no mention of mixed-effects models. Also odd here is the identification of generalized estimating equation (GEE) methods as an "approach to the modeling of transitional effects in longitudinal data" (p. 225), rather than the more typical classification of GEEs as part of the marginal modeling approach. The sections on sparse and high-dimensional data are brief introductions to the complications of such scenarios that also serve also as opportunities for Zelterman to take advantage of every author's prerogative to indulge his own research interests and highlight his own contributions.

Zelterman takes a "bottom-up" approach to describing models for discrete data; that is, he discusses Poisson regression, logistic regression, and log-linear models each in turn in Chapters 2–4. He provides some degree of synthesis in Chapter 5 when discussing coordinate free log-linear models, but only alludes to generalized linear models, without presenting the theory of this more completely unifying class of models.

One of this book's greatest strengths is its inclusion of a large number of useful exercises, each categorized as either theoretical or applied. These problems greatly enhance the book's value as a course text, particularly for a master's-level graduate course oriented primarily toward applications rather than theory. Other nice features are the inclusion of a variety of real-world examples, many from the health sciences, and the integration of SAS code and output into the exposition in the text. Some readers also will appreciate the inclusion and emphasis on specialized topics, such as sample size/power analysis and others mentioned earlier. Overall, these characteristics make for a somewhat idiosyncratic treatment of discrete data analysis that is likely to appeal to many, but not all, readers.

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Randomization, Bootstrap and Monte Carlo Methods in Biology (3rd ed.).

Bryan F. J. MANLY. Boca Raton, FL: Chapman & Hall/CRC, 2007. ISBN 1-58488-541-6. 455 pp. $79.95.

The first edition of this book appeared in 1991 under the current title minus the term "bootstrap." This third edition beautifully illustrates the power and limitations of resampling (e.g., jackknife, bootstrap) methodology. The book focuses on data applications, and gives many further references where randomization and bootstrap methods are used in biology literature. There is some overlap with books by Edgington (1995), which covers randomization tests in the experimental design setting; Efron and Tibshirani (1993), which covers bootstrap methods; and Good (2006), which focuses on computer implementation of resampling methods.

The title might unnecessarily limit this book's potential audience by using the word "biology." It is true that the examples come from biology, but the presentation is so clear that students in a wide variety of disciplines certainly could benefit from it. Indeed, in a review of the first edition, Niknian (1993) commented that the book "is a good source for business students."

One of the strongest messages from the book is that although nonparametric bootstrap methods make minimal assumptions, their performance depends heavily on the situation at hand. For example, the author compares different bootstrap methods for confidence interval construction. For estimating a mean (using small samples from a skewed distribution), the bias-corrected accelerated (BCA) intervals perform reasonably well, but bootstrap-t intervals are clearly the best. But when estimating a correlation, BCA performs, well but the bootstrap-t struggles. When estimating a standard deviation, all methods struggle. This shows that the best method depends on the statistic and parameter of interest. Other factors also influence performance, including the sample size and the specific population being sampled. The lesson from this is that the user needs to study any method for each problem to see whether it is appropriate.

The chapter on time series and spatial data resampling has an incorrect attribution and a few omissions. The model-free block bootstrap was not proposed by Carlstein (1986), who instead developed a related method based on subseries. Kunsch (1989) and Liu and Singh (1992) proposed and studied the block bootstrap for time series data. Further, there are many references on block resampling for spatial data predating Zhu and Morgan (2004) (e.g., Hall 1985;

Possolo 1991; Politis and Romano 1994; Sherman 1996), many of which are discussed in the book by Lahiri (2003).

Overall, the book is clearly written and is an enjoyable read. There is a large survey of the literature with brief summaries given at the end of chapters. The book serves as a wonderful introduction to computer-intensive resampling methods for the users of statistics in a wide variety of disciplines.

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