Book reviews

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Methods for Estimation and Inference in Modern Econometrics
S. Anatolyev and N. Gospodinov, 2011
Boca Raton, Chapman and Hall–CRC
234 pp., £57.99

The econometrics literature has seen growth in the development of techniques for drawing statistical inferences under various types of non-standard conditions. This book provides a valuable addition to the literature by compiling recently developed techniques and the mathematical theory behind such a broad range of statistical approaches.

The book is developed in four sections. The first section consists of Chapter 1 and presents an overview of the conventional econometric methods for parametric estimation, non-parametric regression, testing of hypotheses, confidence interval estimation and bootstrapping. The description of the topics is brief but it is needed to understand the topics that are presented in further chapters. The second section, in three subsequent chapters, is devoted to the estimation of moment conditional models. Chapter 2 describes the generalized empirical likelihood estimators, their asymptotic properties and computational issues. Other topics like generalized method-of-moment estimators and related issues are briefly described. Chapter 3 explains estimation in linear and non-linear models defined by the conditional moment restrictions. It discusses the optimal instruments in the context of instrumental variable models along with their operationalization and explains some other approaches like the local generalized method of moments, generalized empirical likelihood estimation and estimation based on a continuum of moment conditions. Next Chapter 4 details the parametric and non-parametric estimation in misspecified models by using quasi-maximum-likelihood and pseudo-likelihood methods. The third section, comprising the next two chapters, addresses the issues that are related to the methods for asymptotic approximation which can be used in those situations where classical asymptotic theory does not perform satisfactorily. Chapter 5 presents the details of higher order asymptotic approximation for studying the finite sample properties of estimators and the sampling distributions. It mainly describes the stochastic expansion of estimators and Gram–Charlier and Edgeworth as well as saddle point expansions for the sampling distributions of statistics. Chapter 6 provides a review of the asymptotic approximations which reparameterize the parameter as a drifting sequence depending explicitly on sample size. The final, fourth, section is an appendix which lists various results from linear algebra, probability theory and statistics that are useful in understanding the contents in the earlier chapters. Each chapter has a section in which some exercises are adopted from other sources and solved. All chapters include an updated bibliography.

It is necessary that the reader has an adequate statistical background to understand the topics of this book. The exposition is comprehensive and a reader may need to spend some time to understand the implementational aspects of the techniques. Overall, the book is well written, presents updated developments in the area and is an excellent guide to researchers who are interested in theoretical aspects. The contents of the book can be used for doctoral level courses and for research purposes. It is highly recommended for libraries. Overall, the book is a valuable reference for those involved in research and advanced level teaching in this area.

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Spectral Analysis of Large Dimensional Random Matrices, 2nd edn
Z. Bai and J. W. Silverstein, 2010
London, Springer
552 pp., £81
ISBN 978-1-441-90660-1

Today’s statistical landscape is assuredly multidimensional. With the advent of very high dimensional data in physics, in biostatistics and in mathematical finance, statisticians have been increasingly aware of the inadequacy of classical limit theorems when dealing with high dimensional data sets. New asymptotic results are therefore required to tackle these problems.

A modern perspective on high dimensional data that has gained traction in the last three decades is random-matrix theory. A random matrix is a matrix-valued random variable, and random-matrix theory is essentially concerned with the study of the asymptotic properties of matrix-valued random variables. Much of the original interest in random matrices stems from applications in theoretical physics, where random matrices were introduced in the context of quantum mechanics.

This volume constitutes the second edition of a popular reference text on several important results on the asymptotic spectral properties of random matrices, written by two leading authors on this subject. In the 1980s, major contributions to the existence of limiting spectral distributions were made, and this text summarizes these developments in a unified manner. Albeit mainly theoretical, this volume also contains a chapter dedicated to