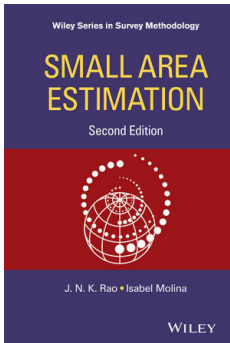


Book Review



Rao, J. N. K. and Molina, I. (2015) (2nd edition).

Small Area Estimation.

Wiley Series in Survey Methodology. John Wiley & Sons, Inc., Hoboken, New Jersey.

ISBN: 978-1-118-73578-7 (cloth)

480 pages

€ 99.30 (Hardcover)

In most of the references in articles after 2003 concerning small area estimation (SAE) the first edition of the pioneering book of Rao has been cited. Google tells us that Rao's book has been cited by 1553 related articles. This shows the importance of the first edition of Rao's book which was the standard textbook on SAE until today. The demand for reliable small area estimates in various applications can be stated worldwide. As SAE methods have further evolved since the years after the first edition was published, a second edition of the book was highly anticipated by the research community. The size increased from 313 pages to 441 pages. The layout has changed, now a page contains significantly more text. This time, Rao co-authored the book with Isabel Molina, PhD, Associate Professor at the Department of Statistics of Universidad Carlos III de Madrid, Spain, since 2009. The second edition provides new and additional developments in the field of SAE. On the back of the book some of the following innovations are mentioned:

- Additional sections describe an R package for SAE and applications with R data sets that readers can replicate
- Numerous examples of SAE applications throughout the book, including recent applications in U.S. Federal programs
- New topical coverage on extended design issues, synthetic estimation, further refinements and solutions to the Fay-Herriot area level model, basic unit level models, and spatial and time series models
- A discussion of the advantages and limitations of various SAE methods for model selection from data as well as comparisons of estimates derived from models to reliable values obtained from external sources, such as previous census or administrative data

Chapter	First Edition	Second Edition
1	Introduction	Introduction
2	Direct Domain Estimation	Direct Domain Estimation
3	Traditional Demographic Methods	Indirect Domain Estimation
4	Indirect Domain Estimation	Small Area Models
5	Small Area Models	Empirical Best Linear Unbiased Prediction (EBLUP): Theory
6	Empirical Best Linear Unbiased Prediction: Theory	Empirical Best Linear Unbiased Prediction: Basic Area Level Models
7	EBLUP: Basic Models	Basic Unit Level Models
8	EBLUP: Extensions	EBLUP: Extensions
9	Empirical Bayes (EB) Method	Empirical Bayes (EB) Method
10	Hierarchical Bayes (HB) Method	Hierarchical Bayes (HB) Method

A comparison between the first and second edition shows that the third chapter: *Traditional Demographic Methods* is no longer included in the second edition. A listing of the chapter titles is given below.

The list of figures increased from 4 to 13, the list of Tables from 20 to 23. Also, the number of examples is more numerous, e.g. subsection 1.6.6 poverty mapping. Some of the headings changed, e.g. Modified Direct Estimators to Modified GREG Estimator. New sections and old sections with significant changes are indicated by an asterisk in the book. This applies to 1 Introduction, 2.7 Optimal Sample Allocation for Planned Domains, numerous parts of 3.2 Synthetic Estimation, part of 4.4 Extensions: Area Level Models, part of 4.6 Generalized Linear Mixed Models, 5.4 Model Identification and Checking, 5.5 Software, part of 6.1 EBLUP Estimation, numerous parts of 6.2 MSE Estimation, 6.3 Robust Estimation in the Presence of Outliers, 6.4 Practical Issues, 6.5 Software, parts of 7 Basic Unit Level Model, especially 7.3 Applications, 7.4 Outlier Robust EBLUP Estimation, 7.5 M-Quantile Regression, 7.6 Practical Issues, 7.7 Software, 7.8 Proofs, most of sections in 8 EBLUP: Extensions, 9.4 EB Estimation of General Finite Population Parameters, 9.7 Design-Weighted EB Estimation: Exponential Family Models, 9.11 Software, parts of 10.3 Basic Area Model, 10.4 Unmatched Sampling Variances \hat{v}_i , 10.7 HB Estimation of General Finite Population Parameters, 10.12 Two-Part Nested Error Model, 10.14 Missing Binary Data and 10.17 Approximate HB Inference and Data Cloning.

331 references were cited in the first edition on 20 pages, about 500 on 26 pages in the second edition. Amongst the references in the second edition are 23 from the

year 2015, 22 from the year 2014 and more than 140 from years 2003-2013. Also older references which were not in the first edition have been added.

The increase of items in the Author Index and Subject Index is not surprising.

Just like the first edition, the second edition is also intended primarily as a research monograph, but is also suited as a fundamental textbook for graduate-level courses in SAE and reliable small area statistics, as is cited in the preface of the book.

Summarized, the second edition of *Small Area Estimation* is a must read for all survey methodologists as well as for practitioners interested in SAE methods. Because of the immense growth in research and applications to SAE methods, it can be expected that a third edition or a new book maybe asked for in near future.

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DOI: 10.12758/mda.2016.006

