

# Preface

This book is intended to introduce graduate students and practicing professionals to some of the main ideas and methods of semiparametric and nonparametric estimation in econometrics. It contains more than enough material for a one-semester graduate-level course and, to a large extent, is based on a course in semiparametric and nonparametric methods that I teach at Northwestern University. In the book, as in the course, I try to emphasize key ideas and provide an intuitive grasp of how things work while avoiding formal proofs, which in this field tend to be highly technical, lengthy, and intimidating. Readers who want to see the proofs can find them in the references that are cited in the book. The book is mainly methodological, but it includes empirical examples that illustrate the usefulness of the estimation methods that are presented. The main prerequisite for this book is knowledge of econometric theory, especially asymptotic distribution theory, at the level found (for example) in the textbooks by Amemiya (1985) and Davidson and MacKinnon (1993) and the *Handbook of Econometrics* chapter by McFadden and Newey (1994).

The literature in semiparametric and nonparametric estimation in econometrics and statistics is huge. A book of encyclopedic length would be needed to cover it exhaustively. The treatment in this book is highly selective. It presents a relatively small set of methods that are important for applied research and that use and, thereby, provide an opportunity for explaining fundamental concepts and results. Because the treatment is selective, some readers will find that their favorite methods are not discussed. However, I hope that this book will provide readers with a background and understanding of key ideas that makes the broader literature more accessible to than it would otherwise be.

This book builds on and greatly extends my 1998 book on semiparametric methods in econometrics. About 50% of the material in this book was not in the 1998 book. The new material includes estimation of nonparametric additive models, including models with an unknown link function, partially linear models, nonparametric instrumental variables estimation, semiparametric proportional hazards models with unobserved heterogeneity, and quantile estimators for nonparametric additive, partially linear, and semiparametric single-index models. In addition, there are brief discussions of local linear and series estimation of conditional mean and quantile functions. Most of the material that was in the previous book is also in this one,

but it has been expanded to include estimation methods, especially for single-index models, that were developed after the previous book was finished.

Many people helped to make this book possible. Wolfgang Härdle provided the initial impetus for the 1998 book and, indirectly, this one by inviting me to give a series of lectures at the annual Paris-Berlin Seminar (which, unfortunately, no longer exists). The 1998 book is an expanded version of these lectures. Numerous students read and commented on parts of the new manuscript. I especially thank Brendan Kline for reading the entire manuscript, finding many errors, and providing many suggestions for improvements. Xiaohong Chen also read and provided very helpful comments on parts of the manuscript. John Kimmel, my editor at Springer, encouraged me to write this book and remained patient even when it became clear that the writing was taking much longer than either of us originally intended it to. Finally, I thank Ronna Lerner for her patience and support throughout the lengthy preparation of this book.

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