

FUMIO HAYASHI
ECONOMETRICS

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Preface

This book is designed to serve as the textbook for a first-year graduate course in econometrics. It has two distinguishing features. First, it covers a full range of techniques with the estimation method called the Generalized Method of Moments (GMM) as the organizing principle. I believe this unified approach is the most efficient way to cover the first-year materials in an accessible yet rigorous manner. Second, most chapters include a section examining in detail original applied articles from such diverse fields in economics as industrial organization, labor, finance, international, and macroeconomics. So the reader will know how to *use* the techniques covered in the chapter and under what conditions they are applicable.

Over the last several years, the lecture notes on which this book is based have been used at the University of Pennsylvania, Columbia University, Princeton University, the University of Tokyo, Boston College, Harvard University, and Ohio State University. Students seem to like the book a lot. My own experience from teaching out of the book is that students think the book is much better than the instructor.

Prerequisites

The reader of this book is assumed to have a working knowledge of the basics of calculus, probability theory, and linear algebra. An understanding of the following concepts is taken for granted: functions of several variables, partial derivatives, integrals, random variables, joint distributions, independence, unconditional and conditional expectations, variances and covariances of vector random variables, normal distributions, chi-square distributions, matrix multiplication, inverses of matrices, the rank of a matrix, determinants, and positive definite matrices. Any relevant concepts above this level will be introduced as the discussion progresses. Results on partitioned matrices and Kronecker products are collected in the appendix. Prior exposure to undergraduate econometrics is not required.

Organization of the Book

To understand how the book is organized, it is useful to distinguish between a *model* and an *estimation procedure*. The basic premise of econometrics is that economic data (such as postwar U.S. GDP) are random variables. A *model* is a