

I would like to suggest that in the future, when you are presented with a new piece of theory or empirical model, you ask these questions:

- (i) What purpose does it have? What economic decisions does it help with?
- (ii) Is there any evidence being presented that allows me to evaluate its quality compared to alternative theories or models?

I think attention to such questions will strengthen economic research and discussion.

As we progress through this book, we will come across several competing hypotheses trying to explain various economic phenomena. For example, students of economics are familiar with the concept of the production function, which is basically a relationship between output and inputs (say, capital and labor). In the literature, two of the best known are the *Cobb–Douglas* and the *constant elasticity of substitution* production functions. Given the data on output and inputs, we will have to find out which of the two production functions, if any, fits the data well.

The eight-step classical econometric methodology discussed above is neutral in the sense that it can be used to test any of these rival hypotheses.

Is it possible to develop a methodology that is comprehensive enough to include competing hypotheses? This is an involved and controversial topic. We will discuss it in Chapter 13, after we have acquired the necessary econometric theory.

1.4 Types of Econometrics

As the classificatory scheme in Figure I.5 suggests, econometrics may be divided into two broad categories: **theoretical econometrics** and **applied econometrics**. In each category, one can approach the subject in the **classical** or **Bayesian** tradition. In this book the emphasis is on the classical approach. For the Bayesian approach, the reader may consult the references given at the end of the chapter.

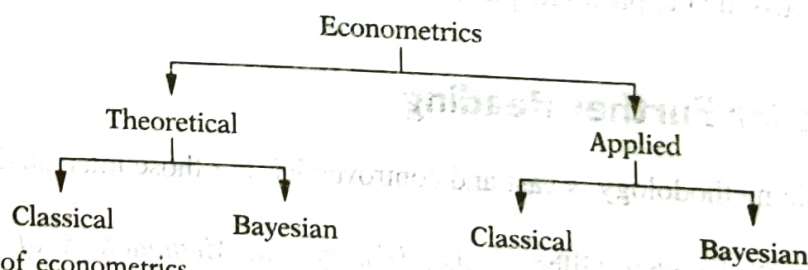


Figure I.5 Categories of econometrics.

Theoretical econometrics is concerned with the development of appropriate methods for measuring economic relationships specified by econometric models. In this aspect, econometrics leans heavily on mathematical statistics. For example, one of the methods used extensively in this book is **least squares**. Theoretical econometrics must spell out the assumptions of this method, its properties, and what happens to these properties when one or more of the assumptions of the method are not fulfilled.

In applied econometrics we use the tools of theoretical econometrics to study some special field(s) of economics and business, such as the production function, investment function, demand and supply functions, portfolio theory, etc.

This book is concerned largely with the development of econometric methods, their assumptions, their uses, and their limitations. These methods are illustrated with examples from various areas of economics and business. But this is *not* a book of applied econometrics in the sense that it delves deeply into any particular field of economic application. That job is best left to books written specifically for this purpose. References to some of these books are provided at the end of this book.

1.5 Mathematical and Statistical Prerequisites

Although this book is written at an elementary level, the author assumes that the reader is familiar with the basic concepts of statistical estimation and hypothesis testing. However, a broad but nontechnical overview of the basic statistical concepts used in this book is provided in **Appendix A** for the benefit of those who want to refresh their knowledge. Insofar as mathematics is concerned, a nodding acquaintance with the notions of differential calculus is desirable, although not essential. Although most graduate level books in econometrics make heavy use of matrix algebra, I want to make it clear that it is not needed to study this book. It is my strong belief that the fundamental ideas of econometrics can be conveyed without the use of matrix algebra. However, for the benefit of the mathematically inclined student, **Appendix C** gives the summary of basic regression theory in matrix notation. For these students, **Appendix B** provides a succinct summary of the main results from matrix algebra.

1.6 The Role of the Computer

Regression analysis, the bread-and-butter tool of econometrics, these days is unthinkable without the computer and some access to statistical software. (Believe me, I grew up in the generation of the slide rule!) Fortunately, several excellent regression packages are commercially available, both for the mainframe and the microcomputer, and the list is growing by the day. Regression software packages, such as **ET**, **LIMDEP**, **SHAZAM**, **MICRO TSP**, **MINITAB**, **EViews**, **SAS**, **SPSS**, **STATA**, **Microfit**, **PcGive**, and **BMD** have most of the econometric techniques and tests discussed in this book.

In this book, from time to time, the reader will be asked to conduct **Monte Carlo** experiments using one or more of the statistical packages. Monte Carlo experiments are "fun" exercises that will enable the reader to appreciate the properties of several statistical methods discussed in this book. The details of the Monte Carlo experiments will be discussed at appropriate places.

1.7 Suggestions for Further Reading

The topic of econometric methodology is vast and controversial. For those interested in this topic, I suggest the following books:

Neil de Marchi and Christopher Gilbert, eds., *History and Methodology of Econometrics*, Oxford University Press, New York, 1989. This collection of readings discusses some early work on econometric methodology and has an extended discussion of the British approach to econometrics relating to time series data, that is, data collected over a period of time.

Wojciech W. Charemza and Derek F. Deadman, *New Directions in Econometric Practice: General to Specific Modelling, Cointegration and Vector Autogression*, 2d ed., Edward Elgar Publishing Ltd., Hants, England, 1997. The authors of this book critique the traditional approach to econometrics and give a detailed exposition of new approaches to econometric methodology.

Adrian C. Darnell and J. Lynne Evans, *The Limits of Econometrics*, Edward Elgar Publishing Ltd., Hants, England, 1990. The book provides a somewhat balanced discussion of the various methodological approaches to econometrics, with renewed allegiance to traditional econometric methodology.

Mary S. Morgan, *The History of Econometric Ideas*, Cambridge University Press, New York, 1990. The author provides an excellent historical perspective on the theory and practice of econometrics, with an in-depth discussion of the early contributions of Haavelmo (1990 Nobel Laureate in Economics) to econometrics. In the same spirit, David F. Hendry and Mary S. Morgan, *The Foundation of Econometric Analysis*, Cambridge