PART I

FUNDAMENTAL METHODOLOGY

The following six chapters constitute Part I of this book. These chapters are grouped together because they represent fundamental results in linear regression analysis. In particular, the methods of ordinary least squares and generalized least squares are reviewed in Chapter 2. In Chapter 3 small sample estimation theory and tests of hypotheses are developed in the context of the classical normal linear regression model. The Cramér–Rao lower bound approach to determining minimum variance unbiasedness of estimators is presented and the likelihood ratio method is used to develop a test statistic for the general linear hypothesis. Some basic asymptotic distribution theory results are presented in Chapter 4. The large sample properties of maximum likelihood estimators are discussed and it is shown that, in large samples, the usual tests of hypotheses are justified even in the presence non-normal disturbances. In Chapter 5 the conventional assumption is relaxed to allow the possibility of stochastic regressors. Under quite general conditions it is shown that the theoretical results derived in previous chapters using the nonstochastic regressors assumption largely remain intact in the more general case of stochastic regressors. In Chapter 6 various types of prior information are considered: exact linear restrictions, stochastic linear restrictions, and inequality restrictions. In addition the basic concepts of Bayesian analysis are presented and the relationship between Bayesian and sampling theory approaches to statistical inference is discussed. In Chapter 7 the properties of preliminary test estimators resulting from using tests of hypotheses in estimator choice are presented. The inadmissability of the preliminary test estimator and its risk properties are outlined and some general remarks are made about the consequences and scope of data mining via preliminary test procedures. Rounding out the chapter, Stein-rule estimation methods are shown to provide a means of addressing the inferior risk properties obtained from making estimator choice dependent upon the outcomes of tests of hypotheses.