PART II

VIOLATIONS OF BASIC ASSUMPTIONS

The following five chapters constitute Part II of this book. The classical linear regression model and its extension, the classical normal linear regression model, represent the classical assumptions of regression analysis. According to Aitken's theorem (Chapter 2), the use of ordinary least squares in the presence of nonspherical errors causes a loss of estimation efficiency and provides an inappropriate framework for statistical inference. Naturally the violation of the spherical error assumption of the classical regression models is a cause for concern and, when appropriate, adjustments should be made. Two basic characterizations of nonspherical disturbances are heteroscedasticity and autocorrelation. Estimation and tests of hypotheses for errors with these properties are the subjects of Chapters 9 and 10. The estimation method used to correct for both heteroscedasticity and autocorrelation is called feasible generalized least squares. The term "feasible" describes the fact that the unknown error parameters are replaced by consistent estimates thus making operational what would otherwise be a nonoperational generalized least squares estimator. The method of feasible generalized least squares and its properties are discussed in Chapter 8.

Another violation of the classical linear regression model is that of contemporaneous correlation between the error term and an explanatory variable. In such circumstances, the ordinary least squares estimator is inconsistent and inefficient. Two occasions where the contemporaneous correlation condition arises are when coefficients must be estimated in the lagged dependent variable–serial correlation model and in the unobservable variables model. Consistent and efficient methods of estimation for these models are presented in Chapters 11 and 12.