Preface to the Third Edition

This third edition updates the second edition to reflect the additions to the software made in Stata 11, which was released in July 2009. The updates include syntax and output changes. The two most notable differences here are Stata's new treatment of factor (categorical) variables and Stata's new syntax for obtaining predictions and other diagnostics after `stcox`.

As of Stata 11, the `xi:` prefix for specifying categorical variables and interactions has been deprecated. Whereas in previous versions of Stata, you might have typed

```
. xi: stcox i.drug*i.race
```

to obtain main effects on `drug` and `race` and their interaction, in Stata 11 you type

```
. stcox i.drug##i.race
```

Furthermore, when you used `xi:`, Stata created indicator variables in your data that identified the levels of your categorical variables and interactions. As of Stata 11, the calculations are performed intrinsically without generating any additional variables in your data.

Previous to Stata 11, if you wanted residuals or other diagnostic measures for Cox regression, you had to specify them when you fit your model. For example, to obtain Schoenfeld residuals you might have typed

```
. stcox age protect, schoenfeld(sch*)
```

to generate variables `sch1` and `sch2` containing the Schoenfeld residuals for `age` and `protect`, respectively. This has been changed in Stata 11 to be more consistent with Stata's other estimation commands. The new syntax is

```
. stcox age protect
. predict sch*, schoenfeld
```

Chapter 4 has been updated to describe the subtle difference between right-censoring and right-truncation, while previous editions had treated these concepts as synonymous.

Chapter 9 includes an added section on Cox regression that handles missing data with multiple imputation. Stata 11's new `mi` suite of commands for imputing missing data and fitting Cox regression on multiply imputed data are described. `mi` is discussed in the context of `stcox`, but what is covered there applies to `streg` and `stcrreg` (which also is new to Stata 11), as well.

Chapter 11 includes added discussion of three new diagnostic measures after Cox regression. These measures are supported in Stata 11: DFBETA measures of influence, LMAX values, and likelihood displacement values. In previous editions, DFBETAs were discussed, but they required manual calculation.

Chapter 17 is new and describes methods for dealing with competing risks, where competing failure events impede one's ability to observe the failure event of interest. Discussion focuses around the estimation of cause-specific hazards and of cumulative incidence functions. The new `stcrreg` command for fitting competing-risks regression models is introduced.

College Station, Texas   Mario A. Cleves
July 2010   William W. Gould
                                                         Roberto G. Gutierrez
                                                          Yulia V. Marchenko