Simon Wood

Simon Wood, Mathematical Science, University of Bath, UK

Abstract

The Cox proportional hazards model for time-to-event data has reigned supreme in the medical world for decades. For example, it is almost always used in the analysis of prognostic factors and of clinical trials data. However, it has weaknesses, particularly in the handling of the baseline hazard function (which is 'partialed out' and essentially ignored) and in coping with non-proportional hazards, in particular time-dependent (TD) effects of covariates. TD effects are often encountered in data with long-term patient follow-up. In this talk, we outline an alternative approach that uses a class of flexible parametric models (FPMs) for right-censored survival data. The methodology has largely been developed over the past decade or so. Examples are given in prognostic modelling. Extension to handle TD effects is touched on. We rapidly overview the contents of parts of our StataPress book (Royston & Lambert 2011 'Flexible Parametric Survival Analysis using Stata: Beyond the Cox model'). A surprisingly wide range of interesting and important problems in survival analysis can conveniently be tackled using FPMs. In a simple illustrative example of a randomized trial, we present some functions, easily estimated within the FPM framework, that are awkward or unobtainable with the Cox model. FPMs are comprehensively implemented in the -stpm2- package for Stata. More limited versions for R (rstpm2, M Clements; flexsurvspline, part of C Jackson's flexsurv package) are also available.