

STANFORD UNIVERSITY
DEPARTMENT OF STATISTICS
DEPARTMENTAL SEMINAR

4:15 p.m., Tuesday, November 7, 2000
Sequoia Hall Rm. 200
(Cookies at 3:45 in 1st Floor Lounge)

Jane L. Hutton
University of Warwick, UK

Models for survival data: choice between accelerated life and proportional hazards models

In medical, engineering and economic applications, the choice between the proportional hazards or the accelerated life families of models is rarely discussed. The proportional hazards family is widely used in medicine. Accelerated life models have conventionally been used in reliability and economic applications.

We discuss the impact of misspecifying fully parametric proportional hazards and accelerated life models. For the uncensored case, misspecified accelerated life models give asymptotically unbiased estimates of covariate effect, but the shape and scale parameters depend on the misspecification. The covariate, shape and scale parameters differ in the censored case. Asymptotic and first order results are compared. Simulation is used to investigate whether the asymptotic results hold for small samples.

Accelerated life models are more robust to misspecification than proportional hazards. Parametric proportional hazards models do not have a sound justification for general use: estimates from misspecified models can be very biased, there is a loss of power, and misleading results for the shape of the hazard function can arise. Misspecified survival functions are more biased at the extremes than the centre. Estimates of covariate effects for misspecified fully parametric models are compared with those from a Cox proportional hazards model, and survivor function estimates compared with Cox and Kaplan-Meier estimators. The comparative robustness, in terms of estimation of covariate effect, and size and power of tests of effect, of the Weibull model and the Cox proportional hazards model merit further investigation.