

Some Pictures from Cox-Model Fits

These pictures go along with the Splus Log on Cox-model fits, supplied as a Handout at URL:

<http://www.math.umd.edu/~evs/s798S/CoxModLog.txt>.

Kaplan-Meier Plots for Two Dialysis-patient Groups (1=solid)

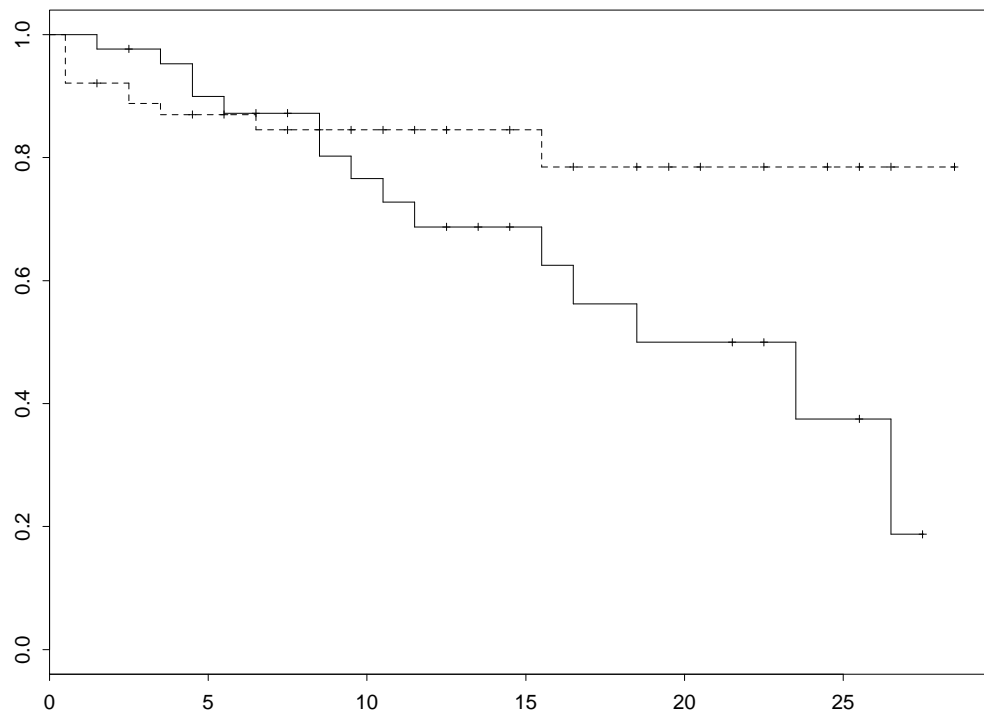


Figure 1: Two separate Kaplan-Meier plots for the separate groups (=1,2) of Dialysis patients in the Dialys.fram data-frame created from Sec. 1.4 data. The objective was to see if proportional and/or linear cumulative hazards are plausible.

Cumulative Hazard Functions from 2 Separate Dialysis Groups

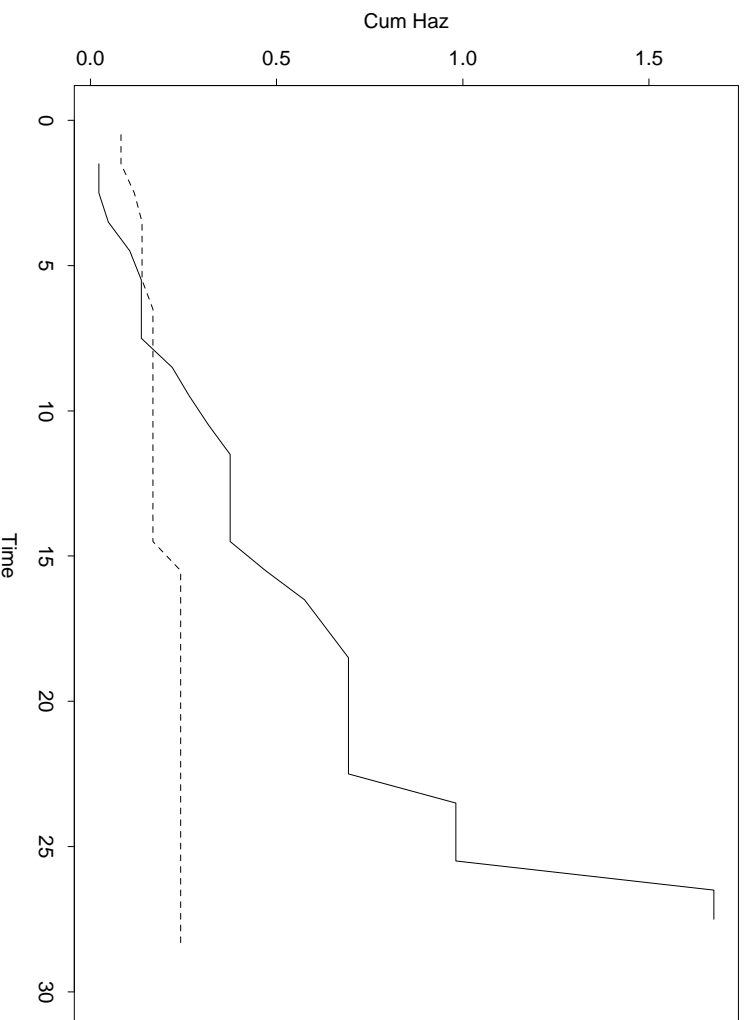


Figure 2: Plots of cumulative hazard functions corresponding to the two dialysis groups' separate survival, cf. Figure 1. Here it may not look too believable that the cumulative hazards are proportional or linear on the whole line, but these assumptions look roughly valid up to time $t = 20$.

Summary Survival Curve estimate from Dialysis Data

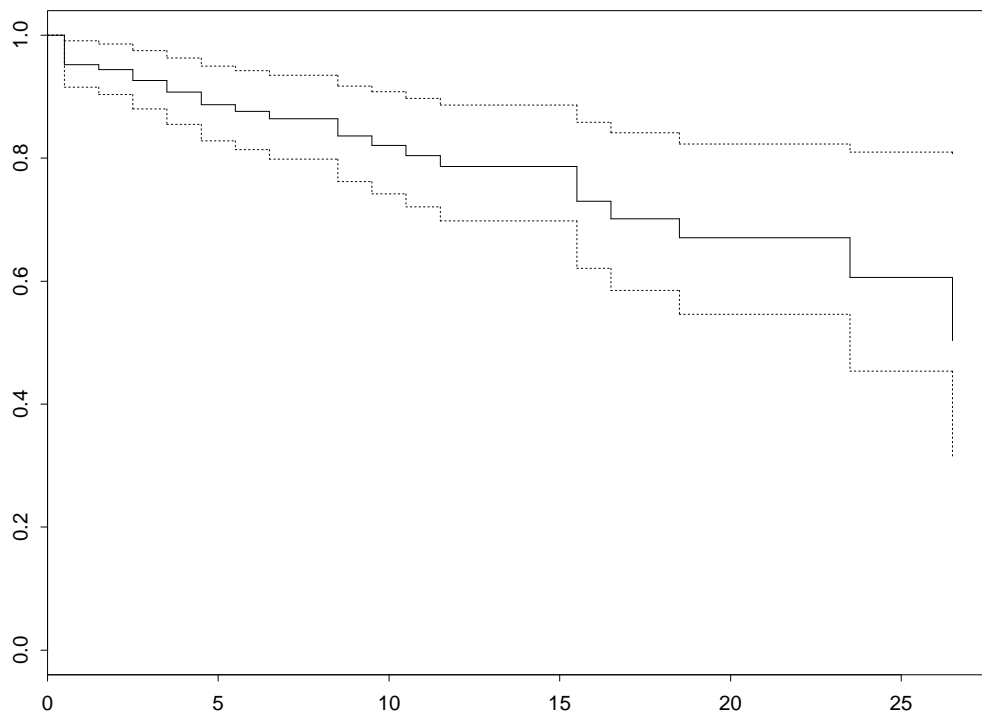


Figure 3: Summary survival curve along with pointwise confidence intervals, as fitted and produced by Splus3.4 functions `coxph`, `survfit`.

Cox-Model Nuisance Survival Curve Estimator, Dialysis Data

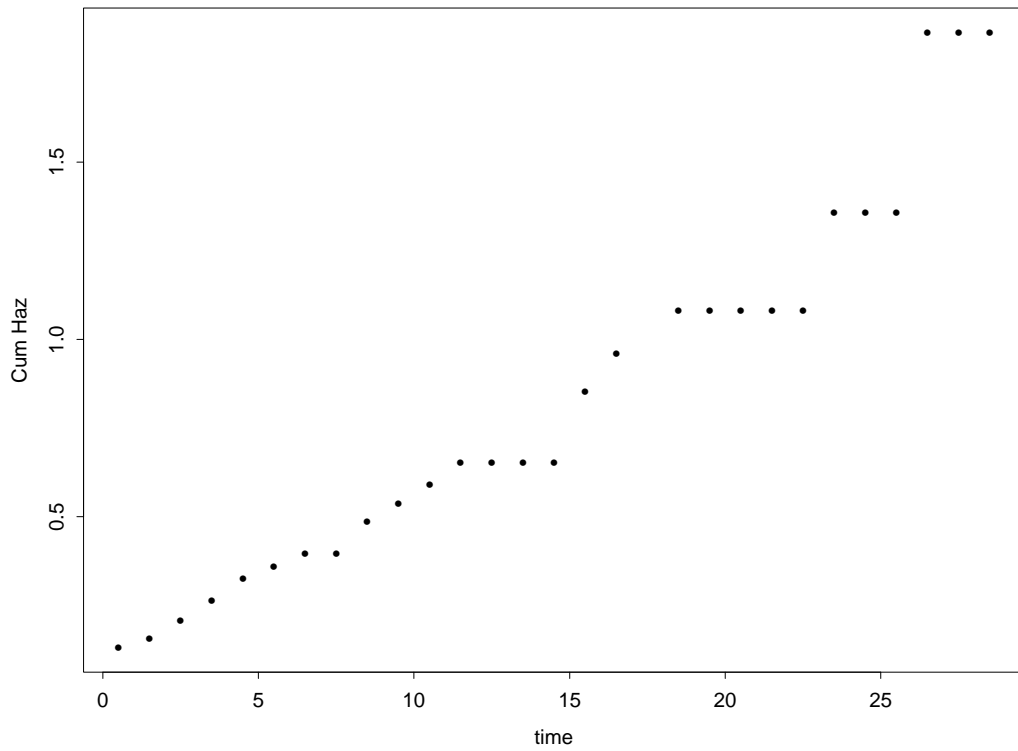


Figure 4: Plot of nuisance cumulative hazard estimator using fitted Cox-model from `coxph` on two-group Dialysis data. The nuisance hazard was generated directly from `Splus` calculated output, using fitted Cox-model coefficient $\beta = -0.613$, along with numbers at risk and observed deaths produced by `survfit`. Note that the resulting nuisance hazard is quite linear looking, suggesting that Cox model and exponential model are about equally valid.

(Cum-) Hazard ratios for Gp1 over Gp2, Dialysis data

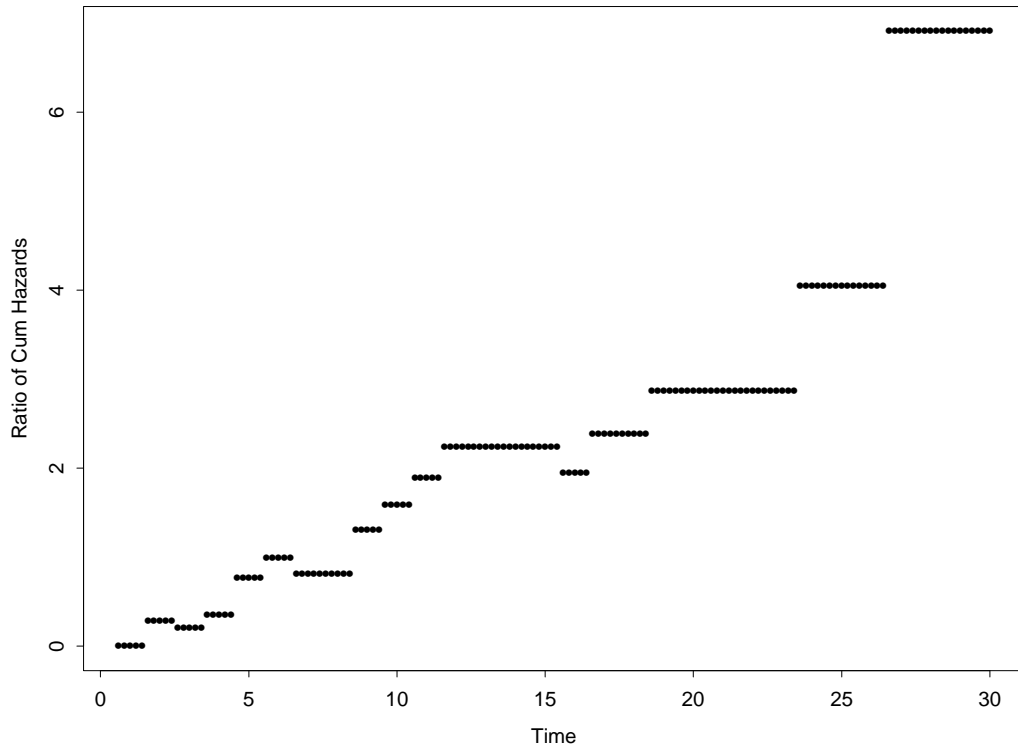


Figure 5: Plot of ratio of interpolated (piecewise-constant right-continuous) estimated cumulative hazards for Group 1 over Group 2 from two-group Dialysis data. Note the systematic increase, suggesting that the proportional-hazards assumption is violated, which we found also by looking at a Cox-model fit with time-dependent-covariate $I(Gp = 1) \times \log(time)$.

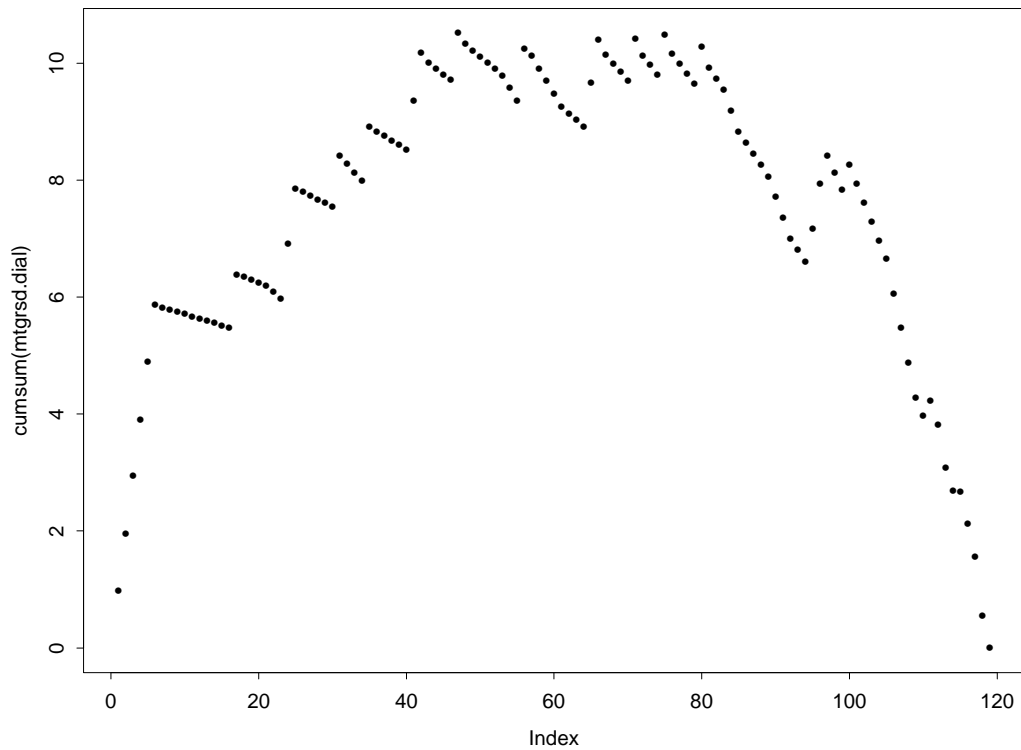


Figure 6: Plot of raw martingale cumulative residuals from the Cox-model fit (without any time-dependent covariates) in the original sequence order from data-frame Dialysis.frame, which was ordered by event-time first within Group 1 followed by event-time-ordered individuals from Group 2. The picture shows that all of the Group 1 individuals had hazards underestimated by the Cox model. (That is, their indicators of observed failures were on average larger than the model-based compensating hazards.) Similarly, the Group 2 individuals had hazards overestimated by the model.

Dialysis Data, Cox-Model Diag Plot Based on Stand Cum Mtg Resids

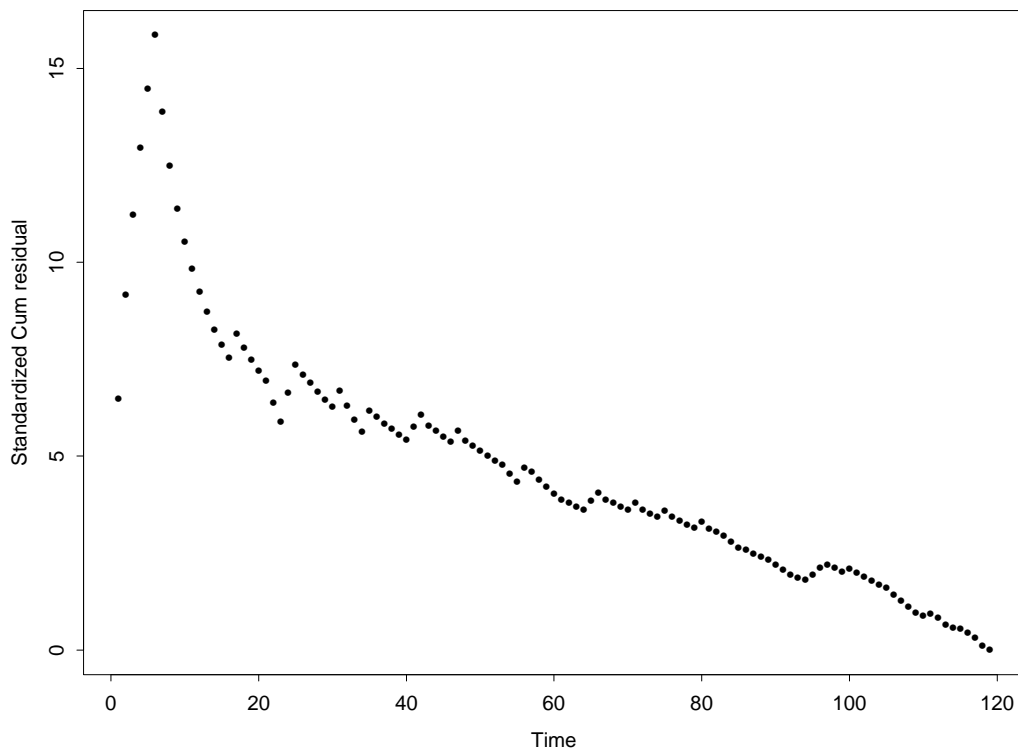


Figure 7: Plot of standardized martingale cumulative residuals from the Cox-model fit to the Dialysis data; otherwise just as in Figure 6. Again we conclude that the Cox model shows very significant non-proportionality of hazards, and is thus not an adequate fit to the data.