

HW: Duration Data

In the following, you will be expected to analyze real data (as opposed to the monte carlo data we've been using so far). Write your results as if you're writing a lab report. I do not expect a 20 or 30-page paper. However, clearly lead the reader through your model, results, and your interpretation/discussion. Additionally, while I do not expect you to be an expert in these substantive areas, do treat them seriously, as if you were actually conducting research on these topics.

King, Alt, Burns, and Laver (KABL) (1990 *AJPS*) study the duration of parliamentary cabinets. Their data (COAL.DAT) can be found on my web site, along with the codebook COAL.CMD.

1. Replicate the KABL results for their model 2.4 in Table 2. You will need to implement a censored exponential model for this.
2. Replicate the KABL model 2.4, but using a censored Generalized Gamma model. Interpret your results (with tables and graphs). Make sure to interpret/discuss the Generalized Gamma auxiliary parameters as well. In addition to assessing the effects of variables, create a version of KABL's Table 3 based on the Generalized Gamma model and compare your results to theirs.
3. Replicate the KABL model 2.4, but using a Cox proportional hazards model. Implement both the Breslow and Efron methods for ties. Substantively interpret your results. Do the Breslow and Efron methods yield different results?
4. Now compare the Efron-Cox model with the Generalized Gamma model. Will inferences based on the Cox model differ from those based on the Generalized Gamma? Choose two interesting profiles of regressors and plot the hazard function and the survival function for each model. (Use the Kalbfleish & Prentice estimator for $\hat{\alpha}_i$.) Do they substantively differ?

Note that in chapters 3 and 4 of *Event History Modeling*, Box-Steffensmeier and Jones use the KABL data for a number of analyses. You may want to replicate their tables — which are similar to KABL's model 2.4 — to double-check your code. Also, R contains a library/package called "survival." You may want to use that to verify your code.

EXTRA CREDIT (1 pt): Compare plots of the baseline hazard rate and baseline survival functions using the Jones & Box-Steffensmeier estimator of $\hat{\alpha}_i$ vs the Kalbfleish & Prentice estimator.