

# Advanced Maximum Likelihood Estimation

## ICPSR 2017

### Exercise One

#### Introduction and Data

The purpose of this exercise is to estimate and interpret parametric, Cox proportional hazards, and discrete-time models, and to compare the conclusions one might draw from them. The subject is leadership tenure; the data (available in [Stata](#) and [CSV](#) formats) are drawn from the *Archigos* project, directed by Kristian Gleditsch, Hein Goemans, and Giacomo Chiozza (see [here](#) for details). They consist of data on 3,023 world leaders who served between 1875 and 2004, inclusive ( $NT = 15446$ ), and include time-varying information on how long the leader was in office (in both days and rounded to the nearest year) and an indicator of when s/he left office.\*

We're not going to get too complicated here; the relevant covariates are:

- **age** of the leader, in years,
- **female**, which means exactly what you think it does, and
- five indicator variables for region: **LatinAmerica**, **Europe**, **Africa**, **MidEast**, and **Asia** (with North America omitted as the implicit reference category).

#### Assignment

1. Begin by fitting one or more parametric model(s) of leader survival, using some combination of the seven covariates provided. Use your own judgement about (e.g.) if and how to specify interactions and other such things. Talk briefly about the results you obtain, being sure to include a discussion of the substantive importance of each covariate.
2. Reestimate the model in (1) using Cox's proportional hazards model. Again, use what you have learned in class and the readings to make informed, justifiable choices about what sort of model to estimate. Once again, briefly discuss your findings, this time with explicit attention to any differences between the parametric and Cox model results.
3. Finally, fit one or more models using a discrete-time (GLM-based) approach, and discuss those results in both substantive and statistical terms. Pay particular attention to similarities and differences across the findings from each set of models.

This assignment is due Thursday, August 10, 2017 at 11:59 p.m. EDT. Exercises should be submitted *electronically*, in *PDF format*, by e-mailing them to Zorn ([zorn@psu.edu](mailto:zorn@psu.edu)) or Lewis ([lewisdo@umich.edu](mailto:lewisdo@umich.edu)). In addition to your responses to the items above, please include all code used to fit models, conduct diagnostics, generate plots, and so forth.

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\*For now, we'll put aside the important and fascinating question of the various means by which leaders can leave office, and treat all departures as equivalent to one another.