Course Description

This section of the advanced MLE course will cover methods and models for duration data. Duration data record the length of time until some event occurs, for example, the termination of a cabinet government or the time until an unemployment spell ends. Because time-to-event occurrence is an important feature of these kinds of data, methods suitable to duration data are often referred to as event history analysis. In this course, we will consider a wide variety of event history modeling methods. Students will be asked to complete some problem sets that will involve estimating and interpreting event history models. In addition to consideration of duration models, we will take a “side-trip” and consider some non-traditional (i.e. not widely used) categorical models and consider their applicability to duration data. “Tutorials” will be available to students that describe some implementation issues pertinent to these models. Additionally, some lecture notes will be available as well. Any material necessary for downloading will be available at my website: http://psfaculty.ucdavis.edu/bsjjones. From here, you will be able to follow a link to this course to access tutorials, lecture notes, and article manuscripts.

Readings

The primary text will be Box-Steffensmeier and Jones’ *Event History Modeling: A Guide for Social Scientists* (Cambridge University Press, 2004). There will also be some assigned readings from Hosmer et al *Applied Survival Analysis*. In the daily itinerary of topics, several articles will also be listed. Many of these articles include applications. As I am a political scientist, many of the applications will be from political science, although I have identified several works from sociology, economics, and demography. In general, I will not discuss specifics from the applied articles. They are there to help give you a feel for how these kinds of models are implemented.

Requirements

Students are expected to do the assigned readings and pay attention in class. There will be two or three short problem sets. The problem sets will entail estimation and
interpretation of a variety of duration models. We will make use of both the R computing environment and Stata. Lecture notes and tutorials will be available on my website. Here, relevant code for both R and Stata can be found. Finally, students will be asked to turn in a short (1-2 page) research prospectus that outlines a research question(s) and hypotheses that could be appropriately tested using duration modeling techniques.

**Itinerary**

My principal goal is to give you an introduction to the fundamental elements of duration modeling and then consider in some detail parametric, non-parametric (via the Cox model), and “discretized” duration models for single-event and multi-event duration data. I do not assume any prior knowledge of event history modeling, though I obviously will assume knowledge of the basic principals of maximum likelihood estimation as well as a thorough understanding of the classical linear model and traditional binary link models (like logit or probit).

The following gives you the day-by-day itinerary of topics. There are two “classes” of readings each day: core and application. It is important that the core readings be completed in their entirety. Several applications are listed for each day’s topics. You will not have time to read each application: I recommend choosing a couple that may be of interest to you. Just about all of the application readings (as well as the core articles) are available from J-Stor (http://www.jstor.org). Applications are highly useful to read and I encourage you to read as many of these as you can. The readings below are primarily drawn from the social sciences.

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**DAY 1: Monday, July 20**

**Preliminaries: Event History Data and the “Moving Parts” of Event History Analysis and an Introduction to Modeling Strategies**

Core Readings:
- Box-Steffensmeier and Jones, Chapters 1—2.
- Hosmer et al, Chapters 1-3.

Applications:

**DAY 2: Tuesday, July 21**
Describing and Modeling Duration Data: The Kaplan-Meier Estimator (and related estimators) and Parametric Models

Core Readings:
• Box-Steffensmeier and Jones, Chapter 3.
• Hosmer et al, Chapter 8

Applications:

DAY 3: Wednesday, July 22
Estimation and Model Selection Issues in the Application of Parametric Duration Models

Core Readings:
• Box-Steffensmeier and Jones, Chapter 3.

Applications
DAY 4: Thursday, July 23
The Cox Proportional Hazards Model

Core Readings:
• Box-Steffensmeier and Jones, Chapter 4.
• Hosmer, Chapters 3-4

Applications (Cox Model):

DAY 5: Friday, July 24.
The Proportional Hazards Property and other Cox Model Diagnostics and Other Issues

Core Readings:
• Box-Steffensmeier and Jones, Chapter 8.
• Hosmer et al, Chapters 6-7

Applications:

DAY 6: Monday, July 27
“Discretized” Duration Data and Associated Models

Core Readings:
• Box-Steffensmeier and Jones, Chapter 5.

Applications:

DAY 7: Tuesday, July 28
Models for Competing Risks: Discrete and Cox

Core Readings:
• Box-Steffensmeier and Jones, Chapter 10.
• Hosmer et al, Chapter 9

Applications:

DAY 8: Wednesday, July 29
Repeatabile Events

Core Readings:
• Box-Steffensmeier and Jones, Chapters 10.
• Cleves, Mario. 1999. “How Do I Analyze Multiple Failure-Time Data?” (From Stata FAQ; available on website).

Applications:

DAY 9: Thursday, July 30
Frailty and Split-Population Models

Core Readings:
• Box-Steffensmeier and Jones, Chapters 9.

Applications:
• Murphy, Mike and Duolao Wang. 1998. “Family and Sociodemographic Influences on Patterns of Leaving Home in Postwar Britain.” Demography. 35: 293—305.

**DAY 10: Friday, July 31.**

**Special Topics in Duration Analysis**

Readings: TBA