DEPARTMENT OF POLITICAL AND SOCIAL SCIENCES

SPS 3rd term workshop 2024 – 2025

Event history analysis

Instructor: Camille Portier, Max Weber Fellow

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Dates and schedule:

Wednesday 21 May @ Badia Fiesolana, Seminar Room 3 – 9:30 – 12:30 and 14:00-16:00
Thursday 22 May @ Badia Fiesolana, Seminar Room 2 - – 9:30 – 12:30 and 14:00-16:00

Credits: 10

Outline

Event history analysis (also known as hazard, survival, duration, failure-time, etc analysis) is a family of methods for the timing of discrete outcomes over time. Its main applications in sociology include demographic events (births, deaths), entry and exit from social relationships (marriage, employment), collective action (protests, coups), and formal organizational change (passage of a law, adoption or abandonment of a corporate program). This class introduces main concepts, models, and measurement issues in event history analysis, and allows students to gain practical familiarity with this methodology. The software used during the course is Stata.

Books

- Cleves, M., Gutierrez, R.G., Gould, W. & Marchenko, Y.V. 2010. An Introduction to Survival Analysis Using Stata. Stata Press. (with code for stata)
- Mills, Melinda. "Introducing survival and event history analysis." (2010): 1-300. (with code for R)

For each session, I have attached the relevant chapters from the main methods book under the session title.

Why event history analysis and its basic concepts.

Cleves et al: 1-2, 4-5
Mills et al: 1-2-3

Nonparametric (Descriptive) Methods: Life tables and Kaplan-Meiers

Cleves et al: 6-8.
Mills: 4

Semiparametric models: Cox models
Cleves et al: 3, 9-10
Mills: 5

Parametric models: Exponential models and others
Cleves et al: 12-13
Mills: 6

Discrete EHA and event counts
Mills: 9-10

More detailed

1. Why Event History Analysis and Its Basic Concepts
(Cleves et al: Chapters 1-2, 4-5; Mills et al: 1-2-3)

This session introduces the foundational concepts of event history analysis (EHA), also known as survival analysis. The key focus is on why EHA is needed in social sciences, medicine, and other applied fields. Topics include:

- Defining time-to-event data: What makes EHA unique compared to other statistical methods?
- Censoring: Right-censoring, left-censoring, and interval-censoring explained.

2. Nonparametric (Descriptive) Methods: Life Tables and Kaplan-Meier Estimators
(Cleves et al: Chapters 6-8 Mills: 5)

This session focuses on nonparametric methods, which provide a way to describe survival distributions without assuming an underlying probability model. The two main methods discussed are:

- Hazard and survival functions: Understanding key functions in EHA and how they describe event occurrence.

- Kaplan-Meier Estimator:
  - A stepwise approach to estimate the survival function.
  - Handling censored data effectively.

3. Semiparametric Models: Cox Proportional Hazards Models
(Cleves et al: Chapters 3, 9-10 ; Mills: 5)

This session introduces the Cox proportional hazards model, a widely used semiparametric method that allows estimation of hazard ratios without assuming a specific baseline hazard function. Key topics include:

- Cox model fundamentals:
  - The proportional hazards assumption.
  - Interpreting hazard ratios.
  - Partial likelihood estimation.

- Assessing the proportional hazards assumption:
  - Graphical methods.
  - Statistical tests for proportionality.

4. Parametric Models: Exponential Models and Others
(Cleves et al: Chapters 12-13; Mills: 6)

This session explores parametric models, which assume a specific distribution for survival times. These models are useful when prior knowledge suggests a particular time-to-event pattern. Topics covered include:

- The exponential model:
  - Assumes a constant hazard rate over time.
  - Suitable for modeling Poisson-like survival data.

- The Piecewise mode model:
  - to explain time-varying hazards

5. Discrete Event History Analysis and Event Counts
(Cleves et al: Chapters 12-13; Mills: 9-10)

This session discusses methods for analyzing discrete-time survival data and event count models:

- Discrete-time survival analysis:
  - When time is measured in discrete intervals (e.g., monthly or yearly data).
  - Logistic regression approach to survival models.

- Modeling event counts:
  - Poisson regression for event count data.
  - Negative binomial regression for overdispersed count data.
  - Interpreting coefficients in event count models.