MAXIMUM LIKELIHOOD ESTIMATION II: ADVANCED TOPICS
Models for Panel and Time-Series Cross-Sectional Data
Survival Analysis

Section I: Models for Panel and Time-Series Cross-Sectional Data
Weeks 1-2 (July 23rd – August 3rd)
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Section II: Survival Analysis
Weeks 3-4 (August 6th – August 17th)
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Course Description

These two weeks of the advanced MLE course will focus on methods and models for panel and time-series cross-sectional (TSCS) data. These types of data occur when we have observations for multiple units collected at multiple points in time. Panel data typically are sample data in which there is a large number of cross-sectional units and few time points. TSCS data are typically data in which the units are of interest in themselves, the number of time points is much larger than in panel data, and the number of time points is either larger or approximately equal to the number of cross-sectional units.

This portion of the class will cover several questions that are central to the use of TSCS and panel data. Among these are fixed effects and random effects models, dynamic models, random coefficient models, models for limited dependent variables, models for spatial dependence, and panel attrition. Students will be asked to complete problem sets that involve estimating models for data collected in time and space.

Readings

There are two primary tests for this class:


Requirements

Although not a formal prerequisite, familiarity with statistics at the level of a linear algebra treatment of regression is highly advisable for students enrolled in the course. In addition to the required reading, students will complete a few short problem sets during the course. We will make use of both Stata and R during the course.

Course Outline

The schedule below lists the topics that will be covered during these two weeks. To provide flexibility in the coverage of this material, I don’t provide specific dates for this material, but we
will follow the order below in covering these topics. Additional readings may be added to the material below.

**1. Course Introduction/Panel vs. TSCS Data**

Required Reading:

Hsiao, Chapter 1

Recommended Reading:


**2. Heterogeneity and Pooling/Analysis of Covariance**

Required:

Hsiao, Chapter 2


**3. Fixed Effects Models**

Required:

Hsiao, Chapter 3


Recommended:


**4. Random Effects Models**

Required:

Hsiao, Chapter 3
Recommended:


5. Panel-Corrected Standard Errors

Required:


Recommended:


6. Variable Coefficient Models/Rarely Changing Variables

Required:

Hsiao, Chapter 6


Recommended:


7. Modeling Dynamics in TSCS Data

Required:


Recommended:


8. Models for Categorical and Limited Dependent Variables/Panel Attrition

Required:


Hsiao, Chapters 7 and 8.

Recommended:


9. Spatial Models for TSCS Data

Required:


Recommended:

COURSE DESCRIPTION

The last two weeks of the advanced MLE course will focus on methods and models for survival data. Survival 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 sometimes called “event history analysis”.

This portion of the course will consider a wide variety of survival methods, including parametric, semi-parametric and non-parametric models, and will adopt a practical approach that addresses ways in which to structure duration data, software applications and the interpretation of estimates. Towards the end of the class, some more advanced topics will be covered. Students will be asked to complete a few short problem sets in addition to the required reading.

READINGS

The primary text for this class is:


Additional articles and book chapters will be assigned. These can be obtained through JSTOR and/or will be made available electronically.

REQUIREMENTS

A course in maximum likelihood estimation and/or generalized linear models (such as probit, logit, and event counts) at the level of Scott Long's Regression Models for Categorical and Limited Dependent Variables is a prerequisite for this course. Course participants should also be familiar with the multiple regression model in matrix form. In addition to the required reading, you will be asked to complete a few short problem sets during the course. We will make use of both Stata and R during the course.
COURSE OUTLINE

The schedule below lists the topics that will be covered during the last two weeks of the course. Although the topics are listed by day, please note that this schedule is tentative to allow for some flexibility in the coverage of the material. We will, however, follow the order in which the topics are listed. Additional readings may be added to the schedule.

Day 1: Introduction to Survival Models

Box-Steffensmeier and Jones, Chapters 1 and 2


Day 2: Parametric Survival Models

Box-Steffensmeier and Jones, Chapter 3


Day 3: Cox’s Proportional Hazards model

Box-Steffensmeier and Jones, Chapter 4


Day 4: Discrete-time Models

Box-Steffensmeier and Jones, Chapter 5


Day 5: Model-building and Diagnostics I

Box-Steffensmeier and Jones, Chapters 7 and 8

Day 6: Model-building and Diagnostics II


Day 7: Unobserved Heterogeneity

Box-Steffensmeier and Jones, Chapter 9


Day 8: Multiple Events and Competing Risks

Box-Steffensmeier and Jones, Chapter 10


Day 9: Other Advanced Topics


Day 10: Personal meetings

No reading