MASTER ECONOMIE
SYLLABUS FEG / AMSE

	M1		M2 ETE		M2 APE	X	M2 EBDS		M2 FQA

COURSE NAME

Duration and transition models (Modèles de transitions et de durées)

COURSE LANGUAGE

English.

TEACHER

Christian Schluter

COURSE DESCRIPTION

Goals:

Students will study models of transitions and durations, and learn how to estimate these using real-world data.

Course outline:

This course is an introduction to modelling transitions into a state of interest (such as the transition into employment from unemployment) and durations (such as unemployment, survival of patients after medical treatment or firms after a financial crash). We start with the basic building blocks (Poisson processes, Markovian transitions, hazard models), and then develop methods for estimation using Maximum Likelihood. Duration data might be incomplete (hence are censored) in that we might not observe exits (individuals might still be in the state of interest at the end of the observation window), and unobserved heterogeneity introduces fundamental identification challenges.

Throughout all methods will be illustrated using examples in the software R, and we will consider several articles that have applied these methods. Several exercise sets will help students deepen their understanding of the theory.

(I) Introduction to Poisson and counting processes

The Poisson process is the classic counting process that models the arrival of new events, and thus transitions (increments) and durations (inter-arrival times). We will study this model, which has several interesting features, such as the independence of increments (transitions), so the Poisson process is a special Markov process (which exhibits a lack of memory property).

Application and illustrations in R : The number of doctor visits following a major health care reform (Poisson regressions). Search models of unemployment.

(II) Introduction to Markov processes

The Poisson process has increments that are independent, hence satisfy the Markov (lack of memory) property. We generalise this idea, consider transition probabilities between states, and look at the evolution of the Markov process in time.

Applications and illustrations. We will study numerical examples using R, and several applications such as Nakajima (2007, ReStud), "Measuring Peer Effects on Youth Smoking Behaviour", and Topa (2001, ReStud), "Social Interactions, Local Spillovers and Unemployment."

(III) Duration and survival analysis: Hazard models

The Poisson model gives a simple duration model, but in many empirical situations this is too limiting as exit rates (hazards) form the state of interest are constant. In many situations the exit rate depends on the duration of stay, for instance the longer the unemployment spell the less likely the exit (duration dependence). We will study the main modelling objects (hazard rate and survival function), examine several parametric models (e.g. the Weibull model), and incorporate observed heterogeneity across individuals (Cox's proportional hazard (PH) model). In order to accommodate unmeasured heterogeneity, we extend the PH model to the mixed proportional hazard (MPH) model. This unobserved heterogeneity will introduce a fundamental identification problem since duration dependence might be confounded by dynamic sorting (individuals of a latent "high" type tending to exit the state of interest more quickly). Since the models are fully parametrically specified, it is natural to estimate these using Maximum Likelihood. One particular characteristic of duration data is that we might not observe an individual's exit from the state of interest; hence these duration data might be incomplete (hence are censored), and this needs to be taken into account in the estimation.

Applications in R: Survival probabilities for smokers, criminal recidivism

SEARCHED SKILLS (please use bullet points)

The students will

- master the theory of transition and duration models,
- learn how to estimate such models in practice using real-world data,
- understand and address the empirical challenges that arise in empirical work

ORGANIZATION

Lectures and exercises

BIBLIOGRAPHY AND TEXTBOOKS

The lecture handouts are fairly self-contained. Supplementary reading is:

- J. Wooldridge, Econometric Analysis of Cross Section and Panel Data.
- van den Berg, G. J. (2001) "Duration models: Specification, identification, and multiple duration". In: Heckman J. J., Leamer E. (eds.), Handbook of Econometrics, Vol V, Chapter 55. Amsterdam: North–Holland, 3381–3460.

MANDATORY PREREQUISITES (useful for elective courses…)

Basic econometrics.

RECOMMENDED PREREQUISITES (useful for elective courses…)

KEYWORDS

Transition models, duration models, Poisson process, hazard and survival functions.

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