

U. Minho Lectures, Portugal

Prof. Nicholas M Kiefer

Summer, 2011

Duration analysis

- I. Duration and Survival Analysis
 - a. Review of problems leading to models based on censored distributions of durations.
 - b. Hazard functions and distributions.
 - c. Likelihood functions, bank data and parametric estimation.
 - d. Proportional hazard (semiparametric) models.
 - e. Heterogeneity in duration distributions.
 - f. Competing risk modeling.
- II. The Counting Process Formulation
 - a. Counting processes and martingales.
 - b. Parametric and nonparametric estimation.
 - c. Semiparametric (Cox-type) estimation.
- III. Bayesian methods for duration analysis.

Computing

Many packages including R, SAS, STATA, Matlab, Gauss, etc. provide programs for analysis of survival data. The course will use R. R is available from cran.r-project.org. Many tested and well-documented (but not guaranteed) packages are available on that website. The course will use "survival." For Bayesian analysis we will also need "mcmc" and "coda." A useful front-end for R is Tinn-R, available at <http://sourceforge.net/projects/tinn-r/>.

References

Notes: Recommended for an introduction and background is Kiefer (1988). See also Neumann (1999). A book with more coverage than the articles is Lancaster (1992). These references appeared as duration analysis via hazard

modeling was new to economics. On search econometrics and its applications, see the book Devine and Kiefer (1991); or for an overview the article Devine and Kiefer (1993). A collection of applied papers on structural search models and applications is Kiefer and Neumann (2006). The article Gomez-Gonzalez and Kiefer (2009) discusses the Colombian bank failure data and application used in these lectures. These references cite many others. On the counting process approach see Andersen *et al.* (1985), which is an insightful survey giving also a useful bibliography. The key, simple, article on residual analysis for specification checking in the Cox model is Schoenfeld (1982). The Cox model is so well known that the original reference is rarely given. It is Cox (1972).

References

- Per Kragh Andersen, Oernulf Borgan, Nils Lid Hjort, Elja Arjas, Jon Stene, and OddAalen. Counting process models for life history data: A review [with discussion and reply]. *Scandinavian Journal of Statistics*, 12:2:97–158, 1985.
- D. R. Cox. Regression models and life tables. *J. Roy. Statist. Soc. Ser. B*, 34:187–220, 1972.
- Theresa J. Devine and Nicholas M. Kiefer. *Empirical Labor Economics: The Search Approach*. Oxford University Press, 1991.
- Theresa J. Devine and Nicholas M. Kiefer. The empirical status of job search theory. *Labour Economics*, 1(1):3 – 24, 1993.
- Jose Gomez-Gonzalez and Nicholas M Kiefer. Bank failure: Evidence from the colombian financial crisis. *The International Journal of Business and Finance Research*, 3:15–31, 2009.
- Nicholas M. Kiefer and George R. Neumann. *Search Models and Applied Labor Economics*. Cambridge University Press, 2006.
- Nicholas M. Kiefer. Economic duration data and hazard functions. *Journal of Economic Literature*, 26(2):646–679, 1988.
- Tony Lancaster. *The Econometric Analysis of Transition Data*. Cambridge University Press (Econometric Society Monographs), 1992.

- George R. Neumann. Search models and duration data. In M. Hashem Pesaran and Peter Schmidt, editors, *Handbook of Applied Econometrics Volume II: Microeconomics*. Blackwell Publishing, 1999.
- D. Schoenfeld. Residuals for the proportional hazards regression model. *Biometrika*, 69:239–241, 1982.