

DYNAMIC TREATMENT EVALUATION USING DURATION ANALYSIS

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Summary:

This lecture series discusses the analysis of treatment effects on economic outcome variables, where the treatment can be characterized by the moment at which it takes place. The standard example concerns training programs for unemployed workers. The program can start at various points in time during unemployment but eligibility stops after leaving unemployment, and one effect of interest concerns the duration of unemployment itself. To analyze such policies we rely on duration analysis (or, equivalently, survival analysis). We focus on model specifications and identification as well as on empirical examples and we expand the framework in various directions.

Survival analysis distinguishes itself from other areas in microeconometrics in a number of ways. First, the hazard rate is regarded to be the feature of the duration outcome distribution that is of primary interest. An example is the transition rate from unemployment to employment as a function of covariates and the elapsed time in unemployment. In accordance to this, time-varying explanatory variables, including treatments or policy reforms that occur during a duration spell, are considered in relation to the hazard rate as a function of the elapsed duration. Notice that treatments may affect the hazard rate rate after participation in a program, but it should also be examined whether it has effects before participation. A third distinguishing feature of survival analysis is that it takes great care of dynamic selection due to unobserved heterogeneity. If the interest is in effects on those who “survive” until a certain duration, then, typically, dynamic selection before that

duration needs to be taken into account. A fourth distinguishing feature is the occurrence of right-censoring of the outcome.

We start by examining the specification and identification of “reduced-form” hazard rate models, notably the Mixed Proportional Hazard (MPH). We provide intuition on what drives identification in the presence of unobserved heterogeneity, and we infer to what extent biases may occur because of misspecifications. We also consider model specifications from the point of view of economic theory. This turns out to be immensely helpful to interpret empirical patterns, notably when it comes to distinguishing between anticipation and ex ante effects (prior to treatment) and ex post effects (after treatment). Next, we examine time-varying explanatory variables and the use of multiple-spell data in reduced-form analysis and we show how these can be utilized in econometric inference.

With this, the stage is set to consider the analysis of treatment effects on duration variables. We argue that “no anticipation of treatment” is an essential condition for identification in a continuous-time model framework. In case of a sudden policy reform, certain average effects of interest are identified without the need to impose a fully identified model like the MPH model. We discuss non-parametric estimation methods.

Next, we consider cases where selective enrollment plays a role. We prove identification of semi-parametric “Timing-of-Events” models based on the MPH model framework and allowing for dependent unobserved heterogeneity. Exclusion restrictions on covariates are not required. We show that the timing of events conveys useful information on the treatment effect. We illustrate this with empirical examples.

After this, we briefly consider treatment effects on post-unemployment outcomes. As an example, one may consider effects of punitive sanctions that are given to UI recipients during unemployment on their post-unemployment wages. Such effects may lead to long-run effects stretching far beyond the spell in which the treatment occurred. Finally, we may briefly consider nonparametric methods based on unconfoundedness assumptions.

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Gerard J. van den Berg

In 2009, Gerard J. van den Berg won the so-called Alexander von Humboldt Professorship prize. This is a prize of 3.5 million euro of research funding, supported by the German federal government through the Humboldt Foundation. Van den Berg was the first economist and social scientist to receive this prize. It involved a permanent position as Professor at the Department of Economics at the University of Mannheim. Before this, he was Top Professor at the Dept. of Economics at VU University Amsterdam. He is also affiliated to IFAU (Uppsala) since 1999. Previously he worked at Northwestern University, Princeton University, and Stockholm School of Economics. Most of his research is in the fields of econometrics, labor economics, epidemiology and health economics, notably on duration analysis, treatment evaluation, search theory, and long-run effects of early-life conditions. He has published in *Econometrica*, *Review of Economic Studies*, *American Economic Review*, *Nature Communications* and other journals. He was Joint Managing Editor of *The Economic Journal* and Associate Editor of the *Journal of Econometrics* and the *Journal of Population Economics*. Since 2013 he is a Fellow of the Econometric Society and since 2010 he is a Member of the Royal Netherlands Academy of Arts and Sciences. After a period at the University of Bristol he is now at the Dept of Economics of the University of Groningen and the Dept of Epidemiology of the University Medical Center Groningen.