

Inference on Conditional Mean Models in Continuous Time: Theory and Application

In the paper, we develop a general methodology to estimate and test for a conditional mean model given in continuous time. Our model specifies the conditional mean of instantaneous change of a given stochastic process as a function of other predictable covariates. The model yields a continuous time regression for the instantaneous change of an underlying process on its conditional mean change with the error process given by a general martingale. We call it a martingale regression, since the parameter in the model is identified by the residual process being a martingale. Upon an appropriate time change, the martingale regression can always be transformed into a regression with the error process given by Brownian motion. We use this property and apply a minimum distance method to estimate the parameters in the model. More specifically, the samples are collected at random time intervals so that the errors become independent normals, and the estimates are defined as the parameter values which make the empirical distribution of the residuals closest to independent normals. We include several illustrative examples, for which the proposed methodology can be useful.