Modeling Financial Durations using Penalized Estimating Functions

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Accurate modeling of patterns in inter-event durations is of considerable interest in high-frequency financial data analysis. The class of logarithmic autoregressive conditional duration (Log ACD) models provides a rich framework for analyzing durations, and recent research is focused on developing fast and accurate methods for fitting these models to long time series of durations under least restrictive assumptions. This talk describes a semi-parametric modeling approach using Godambe-Durbin martingale estimating functions. This approach has wide applicability to several classes of linear and nonlinear time series. It only requires assumptions on the first few conditional moments of the process and does not require specification of its probability distribution. Three approaches for parameter estimation are discussed: solution of nonlinear estimating equations, recursive formulas for the vector-valued parameter estimates, and iterated component-wise scalar recursions. Effective starting values from an approximating time series model increase the accuracy of the final estimates. Our approach is illustrated via a simulation study and a real data example based on high-frequency transaction level data on several stocks. Using this approach for structural break detection in a retrospective and an online way is discussed.