Estimating a non-parametric memory kernel for mutually-exciting point processes

A.E. Clements, A.S. Hurn, K.A. Lindsay

School of Economics and Finance, Queensland University of Technology

V.V. Volkov

Tasmanian School of Business and Economics, University of Tasmania

Abstract

Self- and cross-excitation in point processes in financial econometrics are commonly captured in terms of a simple exponential memory kernel. In this paper, the exponential assumption is relaxed and the resultant non-parametric memory kernel is estimated by solving a system of integral equations each of which is expressed in terms of second-order cumulants. The cumulant-based estimator is shown to be consistent and asymptotically normally distributed and performs well under simulation. Two empirical applications are provided to demonstrate the usefulness of the procedure. The first reveals a significant two-way interaction between trades in the U.S. and U.K. equity markets when both are open, and that the cross-excitation between these markets behaves differently to self-excitation. The second example demonstrates how trading in Japanese stocks changed after the launching of the Arrowhead Trading System. Interesting patterns are revealed showing substantially different results pre- and post-Arrowhead and significant departures from the pattern which a simple exponential kernel would impose.