DYNAMICS OF LIMIT ORDER MARKETS: A JOURNEY ACROSS TIME SCALES

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The dynamics of prices in electronic financial markets is the outcome of the complex interplay between buy and sell orders submitted at different frequencies by various market participants. A difficult problem, of interest to market participants and to regulators, is to understand the nature of this order flow and how the different components contribute to market liquidity and price volatility.

We presents a class of stochastic models which provide analytical insights into these questions: by representing the limit order book as a *queueing system* subjected to a continuous flow of buy and sell orders –represented by a point process- one can use probabilistic and asymptotic methods –fluid limits, diffusion approximations- to obtain analytical insights into the link between liquidity and volatility in electronic order markets.

These mathematical models have interesting connections with random walks in the quarter plane, Feller processes with non-standard (Wentzell) boundary conditions and harmonic functions associated to planar wedges.

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