In this special issue on incomplete markets we bring together three modelling approaches that chart new ground in the application of mean-variance criteria in dynamic hedging and pricing.

In the first paper Kallsen and Vierthauer study optimal hedging of derivatives in a model where the underlying price exhibits stochastic volatility and both the underlying price and its volatility have jumps. Models of this kind are notable for their high degree of realism as well as, perhaps synonymously, their substantial incompleteness – one would be hard pushed to make this market complete by adding a handful of derivatives. Using a novel approach which exploits semimartingale characteristics the authors provide tractable formulae for the optimal hedge ratios and for the unconditional variance of the resulting hedging risk. The quantification of the hedging error in this paper is an important step towards realistic risk assessment of dynamically hedged option portfolios.

In the second paper Matsumoto opens a new line of research in which he considers mean variance hedging with liquidity risk. To make the problem tractable the liquidity risk takes a specific form whereby any order to buy the underlying may be executed only partially or not at all, according to a prespecified probability. This probability can in general depend on the whole history of the underlying price, as well as on other exogenous variables, but it is insensitive to the size of the submitted order. Matsumoto solves this problem in great generality but at the same time his solution is easily implementable in Markov models which are of most interest to practitioners. The solution offers a fundamental insight into the additional hedging risk generated by partial execution of trades and provides a simple recipe for the computation of the optimal hedging portfolio.

In the final contribution, Stoikov and Sağlam investigate quoting strategies which allow a market maker to optimally manage her inventory. Market illiquidity is captured by the arrival rates for buy and sell orders which vary depending on the aggressiveness of the market maker's quotes. This leads to an interesting, but still remarkably tractable mean-variance trade-off for the market maker's P&L drivers, especially in view of the overnight risk of open positions which the authors also include in their model. Stoikov and Sağlam thus offer a new view on how markets determine option prices on an intraday basis which, as their numerical insights suggest, may be of substantial interest to practitioners and academics alike.

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