

# Optimal inventory management and order book modeling

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## Mots-clés :

We model the behavior of three agent classes acting dynamically in a limit order book of a financial asset. Namely, we consider market makers (MM), high-frequency trading (HFT) firms, and institutional brokers (IB). Given a prior dynamic of the order book, similar to the one considered in the Queue-Reactive models [14, 20, 21], the MM and the HFT define their trading strategy by optimizing the expected utility of terminal wealth, while the IB has a prescheduled task to sell or buy many shares of the considered asset. We derive the variational partial differential equations that characterize the value functions of the MM and HFT and explain how almost optimal control can be deduced from them. We then provide a first illustration of the interactions that can take place between these different market participants by simulating the dynamic of an order book in which each of them plays his own (optimal) strategy.

## Références