

# Optimal inventory management and order book modeling

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We propose an optimal inventory management for market makers based on an ergodic model for the limit order book. First, we introduce an order book model with the first bid/ask limits and give some empirical evidences. Next, based on the state of the order book, we present a market making model in the framework of stochastic optimal control of pure jump processes through quasi-variational Hamilton-Jacobi-Bellman equation (QVHJB). Moreover, we present a numerical scheme to solve this QVHJB using the dynamic programming principle. Finally, we illustrate our method with some numerical results using synthetic data.