# Optimal Market Making in a Multi-agent Market under Model Uncertainty: A Reinforcement Learning Approach

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We delve into the optimal market-making challenge in order-driven electronic markets, emphasizing model uncertainty. The study factors in ambiguity concerning order arrival intensities, aiming to derive a strategy robust enough for diverse market conditions. By incorporating a tractable model for the limit order book using Markov Decision Processes, we plan on leveraging Reinforcement Learning to tackle the intricate optimization problem. This methodology allows for a precise depiction of order book dynamics with tick structures, diverging from typical stochastic approaches that focus on price dynamics. We also factor in the scenario of several market makers vying in the same marketplace and analyze the impact of confidential information on the optimal strategy. Both simulations and numerical evaluations are employed to gauge the efficiency of varying methods within our market context. This research is a collaborative effort with Yijiong Zhang, Hoang Hai Tran, and Julian Sester.