Cross-Impact of Order Flow for Optimal Market-making

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# Introduction

Market making (MM) stands as a prominent high frequency trading (HFT) approach extensively employed in major stock exchanges like NYSE and NASDAQ. Unlike HFTs, which are not bound to constant trading, MM focuses solely on ensuring market liquidity through rapid execution of numerous orders within milliseconds. This liquidity provision is pivotal for market stability and investor engagement. The profit for MM entities is derived from the discrepancy between the quoted ask (selling) and bid (buying) prices of stocks. MM firms are obligated to consistently place buying and selling limit orders to augment market liquidity. Market liquidity is gauged by parameters like quoted spread and the number of successful trades, with lower spreads and higher trade volumes indicating higher liquidity.

With the rise of algorithmic trading, human involvement in MM roles has diminished, except in over-the-counter markets such as corporate bonds. MM now heavily relies on high-speed trading systems to capitalize on speed advantages. Nonetheless, mere speed isn't sufficient for MM agents to compete effectively. There's a necessity for automated MM incorporating human-like expertise into high-speed trading. Reinforcement learning (RL) emerges as a viable machine learning technique for automated MM. Recent research has developed RL-based MM agents aimed at maximizing profit and minimizing inventory, serving as the benchmark model for evaluating newer approaches.

# 2 Description of strategy

## 2.1 Literature Review

Our strategy uses machine learning algorithms to predict the evolution of price of the stocks we are looking at based off of . We periodically sample the state of the market and use these models to output a signal indicating whether the price is expected to increase, decrease, or remain globally unchanged. Taking this evolution into account, we post ask and bid orders at a given price, adjusted for the evolution, in order to better capture the trend of the market.

## 2.2 Data