Research Highlight: Portfolio Optimization with Non-linear Price Impact

Work of Assistant Professor Marko WEBER

Standard portfolio optimization models assume that assets can be traded at no cost. In continuous time, this implies infinitely large trading volume, because market participants don't have any incentive to reduce trading. Previous work has analyzed how proportional transaction costs and linear price impact affect optimal trading. Guided by empirical evidence that suggests that price impact is non-linear, this paper assumes instead that price impact is proportional to a power of the order flow.

We find both the optimal trading policy and the implied optimal performance for a long-term investor with constant relative risk aversion who trades a safe asset and a risky asset following geometric Brownian motion. The model recovers, as extreme cases, linear price impact and proportional transaction costs.

Reference:

P. Guasoni, M. Weber, "Nonlinear price impact and portfolio choice". Mathematical Finance, 30, no. 2 (2020): 341 – 376.