# Research Highlight: Portfolio optimization with non-linear price impact

## Work of Assistant Professor Marko H. WEBER

Models with bid-ask spreads and linear price impact have been widely studied in the literature. Yet, empirical evidence suggests that price impact is non-linear. In the model analyzed in the paper, a one-percent increase in trading speed increases price impact by $\alpha$ per cent. For $\alpha=1/2$, this corresponds to the "square-root law" discussed in many empirical studies. Proportional bid-ask spreads and linear price impact are recovered, respectively, with $\alpha=0$ and $\alpha=1$. The paper finds optimal trading strategies and their implied performance for long-term investors with constant relative risk aversion in a market with a safe asset and a risky asset following geometric Brownian motion. Relative to linear price impact, trading speed is lower near the target portfolio, and higher away from the target. This brings the optimal policy closer to its counterpart with proportional bid-ask spreads, in which trading speed is zero inside the buy/sell boundaries, and "infinite" outside.

**References:**

P. Guasoni, M.H. Weber, "Nonlinear price impact and portfolio choice". Mathematical Finance, DOI: 10.1111/mafi.12234