Substitute Hedging with (Cross) Price Impact

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We consider an extension of the optimal execution problem posed in [1] in which the agent holds either shares on an asset which they are restricted from trading in, or an option with such an asset as the underlier. The agent is, however, allowed to trade in another correlated asset. In a similar fashion to previous work, we account for the possibility of price impact, both permanent and temporary, due to the agent's trades. We also include a new feature which is the impact that the agent's trades in a single asset will have on the price of the other asset, deemed cross price impact. In the case where the agent holds shares of an untraded asset we solve in closed form for the optimal trading strategy. When the claim held by the agent has payoff which is non-linear in the untraded asset, we solve in closed form for an approximation of the optimal trading strategy which applies when cross price impact and risk-aversion are small.

References

[1] R. Almgren, N. Chriss , *Optimal Execution of Portfolio Transactions* , Journal of Risk, Volume 3, Number 2, (2000)