Superhedging in illiquid markets

Teemu Pennanen*

Abstract

We study superhedging of securities that give random payments possibly at multiple dates. Such securities are common in practice where, due to illiquidity, wealth cannot be transferred quite freely in time. We generalize some classical characterizations of superhedging to markets where trading costs may depend nonlinearly on traded amounts and portfolios may be subject to constraints. In addition to classical frictionless markets and markets with transaction costs or bid-ask spreads, our model covers markets with nonlinear illiquidity effects for large instantaneous trades. The characterizations are given in terms of stochastic term structures which generalize term structures of interest rates beyond fixed income markets as well as martingale densities beyond stochastic markets with a cash account. The characterizations are valid under a topological condition and a minimal consistency condition, both of which are implied by the no arbitrage condition in the case of classical perfectly liquid market models. We give alternative sufficient conditions that apply to market models with general convex cost functions and portfolio constraints.

*Helsinki University of Technology