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Research interests include:

- **Financial Mathematics**
- **Applied Probability**
- **Stochastic Control and Optimization**

Start-up grant project

Market Viability and Option Pricing under Trading Frictions

Abstract

Optimal portfolio via utility maximization under market frictions is one of the fundamental problems in mathematical finance. Intuitively, market frictions entail a direct negative impact of trading on wealth. As a consequence, the class of feasible strategies has to be modified and thereby the notion of No Arbitrage (NA) condition requires careful investigations. New challenges and mathematical methods become inevitable for this research topic, especially in continuous time models. In the case of linear frictions, i.e., proportional transaction costs, it is proven that the so-called consistent price systems (CPS) are closely related to the NA condition and they successfully take the role of dual elements in portfolio optimization and option pricing problems. However, the existence of CPS is quite restrictive in general market models even with linear frictions. In our series of projects, we are analyzing the market models which do not satisfy all the stringent requirements of the NA condition. Instead of CPS, we aim to determine the minimal condition on the market so that the classical utility maximization and option pricing problems still admit solutions. In the case of proportional transaction costs, a weaker condition of the existence of consistent local martingale systems (CLMS) is proposed in our project. It is shown in our paper that the robust no unbounded cost of portfolio with bounded risk (RNUCBR) implies the existence of CLMS which provides the sufficient condition for several classical fundamental problems in the existing literature. Some explicit examples illustrate our contribution in the reduction of market requirements. Our projects can serve as the first lesson to study the stochastic portfolios and optimal arbitrage in the framework with market frictions. In addition, the super-hedging result for American options and the utility indifference pricing problems given the existence of CLMS need to be addressed in the future.