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Pricing formulas for vulnerable claims and death derivatives

We consider the discrete-time market model described by the triplet $(S, \mathbb{F}, \tau)$. Herein $\mathbb{F}$ is the "public" flow of information which is available to all agents overtime, S is the discounted price process of d-tradable assets, and τ is an arbitrary random time whose occurrence might not be observable via $\mathbb{F}$. This framework covers the credit risk theory where τ represents the default time, the life insurance setting where τ models the death time, and other areas of finance. For various vulnerable claims in credit risk and death derivatives in life insurance, we address the super-hedging pricing valuation problem in many aspects. First of all, we discuss how the Immediate-Profit arbitrage (IP for short), which is the economical assumption that guarantees the existence of the "minimal" super-hedging price $\widehat{P}^{\mathbb{G}}$, is affected by τ. Then we show, as explicit as possible, how the set of all super-hedging prices expands under the stochasticity of τ and its various risks. Afterwards, we elaborate, as explicit as possible, the pricing formulas for vulnerable claims and death derivatives. Finally, we single out explicitly the various informational risks in the dynamics of the price process $\widehat{P}^{\mathbb{G}}$ and quantify them. This latter fact is highly important for the mortality and longevity securitizations.

This talk is based on the following joint work with Emmanuel Lepinette (Paris-Dauphine, France):

T. Choulli and Emmanuel: Super-hedging-pricing formulas and Immediate-Profit arbitrage for market models under random horizon. to appear in Finance and Stochastics. A version of the paper is available at: arXiv:2401.05713.