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Exact replication under portfolio constraint: a viability approach

Abstract: In this talk, we consider the problem of super-replicating a given contingent claim, whenever the incompleteness of the market is due to the presence of closed convex constraints on the portfolio strategies, written in terms of number of shares. In the dimension 1 Black Scholes model, Broadie, Shreve and Soner observed that the price under constraint of a given claim is simply the unconstrained price of a more expensive claim, defined as the facelift transform of the one of interest. For a given model and convex constraint set in dimension d , we exhibit a necessary and sufficient condition under which the latter is true for a large class of European options. Our argumentation relies on the use of viability arguments for BSDEs together with localization procedures. Several financial examples will be considered in this talk. This is a joint work with Jean-Francois Chassagneux, Imperial College and Idris Kharroubi, University Paris-Dauphine.