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Optimal hedging strategies on asymmetric functions

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Abstract. We treat in this paper optimal hedging problems for contingent claims in an incomplete financial market, which problems are based on asymmetric functions. In summary, we consider the problem

$$\min_{\vartheta\in\Theta} E[f(H - G_T(\vartheta))],$$

where H is a contingent claim, Θ, which is a suitable set of predictable processes, represents the collection of all admissible strategies, $G_T(\vartheta)$ is a portfolio value at the maturity T induced by an admissible strategy ϑ, and $f : \mathbf{R} \to \mathbf{R}_+$ is a differentiable strictly convex function with $f(0) = 0$. In particular, under the assumption that there exist two positive constants c_0 and C_1 such that, for any $x \in \mathbf{R}$ being far away from 0 sufficiently, $c_0|x|^p \leq f(x)$, and $|f'(x)| \leq C_1|x|^{p-1}$, where $1 < p < \infty$, we shall prove the unique existence of a solution and shall discuss its mathematical property.

Key words: Mathematical finance, incomplete market, convex function, semimartingale, stochastic integral