Rare event simulation related to financial risks

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In this paper, we develop the reversible shaking transformation methods on path space of [1] to estimate the rare event statistics arising in different financial risk settings which are embedded within a unified framework of isonormal Gaussian process. Namely, we combine splitting methods with both Interacting Particle System (IPS) technique and ergodic transformations using Parallel-One-Path (POP) estimators. We also propose an adaptive version for the POP method and prove its convergence. We demonstrate the application of our methods in various examples which cover usual semi-martingale stochastic models (not necessarily Markovian) driven by Brownian motion and, also, models driven by fractional Brownian motion (non semi-martingale) to address various financial risks. Interestingly, owing to the Gaussian process framework, our methods are also able to efficiently handle the important problem of sensitivities of rare event statistics with respect to the model parameters. Joint work with Ankush Agarwal, Stefano De Marco and Emmanuel Gobet

Références

[1] E.GOBET AND G.LIU , *Rare event simulation using reversible shaking transformations*, SIAM journal on scientific computing, 2015.

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