

# Optimal Dynamic Hedging: A Double-Hedged Monte Carlo Method

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We consider the problem of optimal dynamic hedging of options. Complete market models like the model of Black/Scholes allow to eliminate risk by dynamically trading the underlying asset. In reality the market is far from complete, for various reasons such as discontinuous price processes, existence of bid/ask spreads or discrete hedging. Therefore one should not look for completely eliminating the risk, (i.e. exactly replicating the option) but rather for minimizing it as much as possible. A numerical method which allows to simulate the optimal dynamic hedging of options with the underlying asset has been proposed by [1]. Exotic trading desks however do not hedge only their first order delta exposure, they hedge also their second order (gamma) exposure, as well as their volatility (vega) exposure. We present a numerical method which allows to hedge price and volatility risk with the underlying asset and some other financial derivative. Numerical results will be given illustrating the hedging with the underlying asset and variance swaps.

## Références

- [1] MARC POTTERS AND JEAN-PHILIPPE BOUCHAUD AND DRAGAN SESTOVIC, *Hedged Monte-Carlo: low variance derivative pricing with objective probabilities*, Physica A, 2001.

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