Heston Model

Dimitris Markopoulos

The Heston model is a widely used stochastic volatility model for option pricing. Unlike the Black-Scholes model, which assumes constant volatility, the Heston model allows for volatility to be stochastic, making it more realistic for capturing volatility smiles and skews observed in financial markets.

$$dS_t = rS_t dt + \sqrt{v_t} S_t dW_1(t) \tag{1}$$

$$dv_t = \kappa(\theta - v_t)dt + \varepsilon\sqrt{v_t} dW_2(t) \tag{2}$$

Parameters:
- r – drift rate
- $W_1(t)$ & $W_2(t)$ – Brownian motion (constant correlation ρ)
- κ – mean reversion rate for v_t
- θ – long-term average of v_t
- ε – volatility of the volatility