

Description

Let X_t be a stochastic process representing the price of a stock at time t . The process is assumed to follow a geometric Brownian motion (GBM) with drift μ and volatility σ .

The SDE for X_t is given by:

$$dX_t = \mu X_t dt + \sigma X_t dB_t$$

where B_t is a standard Brownian motion. The solution to this SDE is:

$$X_t = X_0 \exp\left(\left(\mu - \frac{\sigma^2}{2}\right)t + \sigma B_t\right)$$

where X_0 is the initial price of the stock. The expected value of X_t is:

$$E[X_t] = X_0 e^{\mu t}$$

1. Expected Value of X_t

Let X_t be a stochastic process representing the price of a stock at time t . The process is assumed to follow a geometric Brownian motion (GBM) with drift μ and volatility σ .

- $X_t = X_0 \exp\left(\left(\mu - \frac{\sigma^2}{2}\right)t + \sigma B_t\right)$ where B_t is a standard Brownian motion.
- $E[X_t] = X_0 e^{\mu t}$

Let X_t be a stochastic process representing the price of a stock at time t . The process is assumed to follow a geometric Brownian motion (GBM) with drift μ and volatility σ .

- Market Risk:** $X_t = X_0 \exp\left(\left(\mu - \frac{\sigma^2}{2}\right)t + \sigma B_t\right)$ where B_t is a standard Brownian motion.
- Specific Risk:** $X_t = X_0 \exp\left(\left(\mu - \frac{\sigma^2}{2}\right)t + \sigma B_t + \sigma_s B_s\right)$ where B_s is a standard Brownian motion.
- Interest Rate Risk:** $X_t = X_0 \exp\left(\left(\mu - \frac{\sigma^2}{2}\right)t + \sigma B_t + \sigma_r B_r\right)$ where B_r is a standard Brownian motion.
- Inflation Risk:** $X_t = X_0 \exp\left(\left(\mu - \frac{\sigma^2}{2}\right)t + \sigma B_t + \sigma_i B_i\right)$ where B_i is a standard Brownian motion.

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