

Simulating interest rates with the Vasicek model

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$$r_t \sim r_0 e^{-\alpha t} + \frac{\beta}{\alpha} (1 - e^{-\alpha t}) + \sigma \sqrt{\frac{1 - e^{-2\alpha t}}{2\alpha}} N_{0,1}$$

This equation is the exact solution of the one-factor Vasicek interest rate model. In this model interest rates are Normal distributed, and thus can become negative.

Symbol list:

r_0	Initial value at t=0 of the interest rate
r_t	Value of interest rate at time t
α	Mean reversion rate
β	Mean reversion level
$N_{0,1}$	Random sample from a normal (Gaussian) distribution with mean 0 and standard deviation 1.