

A trinomial pricing approach for quadratic interest rate model

Ismail Laachir

March 1, 2012

Premia 14

In the quadratic interest rate model, the evolution of the spot interest rate $r(t)$ is described by the following SDE :

$$\begin{cases} dx(t) = (\alpha(t) - \beta x(t)) dt + \sigma dW(t), \\ r(t) = \frac{1}{2}x(t)^2, \\ x(0) = \sqrt{2r(0)}, \end{cases}$$

where β and σ are constants. α is a time-dependent function determined by the values of β , σ and the curve of the s -maturity zero-coupon prices at time $t = 0$. Notice that $(x(t), t \geq 0)$ is a gaussian process.

Hence the construction of a trinomial tree for quadratic model is similar to the one of Hull&White model. The only difference is that we have $r(t) = \frac{1}{2}x(t)^2$ in the first model and $r(t) = x(t)$ in the second one.

For further information about the trinomial tree in Hull&White model, we send the reader to [there](#).