Source | Model Presentation

hesvasicek2d

1 Description

The Heston-Vasicek2d model generalizes the previous model in the fact that the quantity η is a diffusion model itself. So, the underlying process is now 4-dimensional and is given by: the share price S, the volatility process V, the interest rate r and the continuous dividend η. Under the risk neutral measure, the dynamics are governed by the stochastic differential equation system

$$\begin{aligned}
\frac{dS_t}{S_t} &= (r_t - \eta_t)dt + \sqrt{V_t}\, dZ_t, \\
dV_t &= \kappa_V(\theta_V - V_t)dt + \sigma_V\sqrt{V_t}\, dW_t^1, \\
dr_t &= \kappa_r(\theta_r - r_t)dt + \sigma_r dW_t^2, \\
d\eta_t &= \kappa_\eta(\theta_\eta - \eta_t)dt + \sigma_\eta dW_t^3,
\end{aligned}$$

with initial data $S_0, V_0, r_0, \eta_0 > 0$, where Z, W^1, W^2 and W^3 are suitable and possibly correlated Brownian motions. Note that the processes r and η evolve as a generalized OU process.

2 Code Implementation

```
#ifndef _HESVASICEK2D_H
#define _HESVASICEK2D_H

#include "optype.h"
#include "var.h"

#define TYPEMOD HESVASICEK2D

/* HESVASICEK2D World */
```

```
typedef struct TYPEMOD
{
  VAR T;
  VAR S0;
  VAR vrq;
  VAR kappa;
  VAR theta;
  VAR sigma;
  VAR rho;

} TYPEMOD;

#endif
```