Source | Model Presentation

bscir2d

1 Description

We consider, under the risk-neutral probability measure, the following dynamics for the equity value

$$\frac{dS(t)}{S(t)} = r(t)dt + \sigma_S dZ_S(t), \quad S(0) = S_0 > 0, \tag{1}$$

where $r(t)$ is the short interest rate, σ_S is the constant stock price volatility and $Z_S(t)$ is a standard Brownian motion.
The risk-neutralized process for the short rate is described, as in the Cox-Ingersoll-Ross model [**?**] (CIR hereafter), by the following stochastic differential equation

$$dr(t) = k[\theta - r(t)]dt + \sigma_r\sqrt{r(t)}dZ_r(t), \quad r(0) = r_0 > 0, \tag{2}$$

where k is a constant representing the reversion speed, θ is the long term reversion target, σ_r is a constant and $Z_r(t)$ is a standard Brownian motion whose correlation with $Z_S(t)$ is ρ.

2 Code Implementation

```
#ifndef _BSCIR2D_H
#define _BSCIR2D_H

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

#define TYPEMOD BSCIR2D
```

```
/* BSCIR2D World */
typedef struct TYPEMOD {
  VAR T;
  VAR S0;
  VAR Sigma;
  VAR r0;
  VAR k;
  VAR SigmaR;
  VAR theta;
  VAR Rho;
  VAR Mortality;
} TYPEMOD;

#endif
```

References