`Source | Model Presentation`

bns

1 Description

Come from [1].

The square volatility follows the SDE of the form :

$$d\sigma_t^2 = -\lambda\sigma_t^2 dt + dz_{\lambda t}$$

where $\lambda > 0$ and z is a subordinator. The risk neutral dynamic of the log price $x - t = logS_t$ are given by

$$dW_t = (r - q - \lambda k(-\rho) - \sigma^2/2)dt + \sigma_t dW_t + \rho dz_t, \quad x_0 = log(S_0).$$

where $k(u) = \log E \exp -uz_1$. Choice z_t as a compound poisson process,

$$z_t = \sum_{n=1}^{N_t} x_n$$

where N_t is a Poisson process with intensity parapmeter α and each x_n follows an exponential law with mean $\frac{1}{\beta}$. One can show that the process σ_t^2 is a stationary process with a marginal law that follows a Gamma distribution with mean α and variance $\frac{\alpha}{\beta}$. In this case,

$$k(u) = \frac{-au}{b+u}.$$

2 Code Implementation

```
#ifndef _BNS_H
#define _BNS_H

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

```
#define TYPEMOD BNS


typedef struct TYPEMOD {
  VAR T;
  VAR S0;
  VAR Divid;
  VAR R;
  VAR Sigma0;
  VAR Lambda;
  VAR Rho;
  VAR Beta;
  VAR Alpha;
} TYPEMOD;

#endif
```

References

[1] Ole E. Barndorff-Nielsen and Neil Shephard. Non-Gaussian Ornstein-Uhlenbeck-based models and some of their uses in financial economics. *J. R. Stat. Soc. Ser. B Stat. Methodol.*, 63(2):167–241, 2001. 1