

affine3d

1 Description

Three factor affine model is defined by an EDS which describes the evolution of the spot rate r_t .

The instantaneous short rate r_t is defined as a linear combination of 3 factors, $r(t) = \delta + \sum_{j=1}^3 x_j(t)$, described by Markov processes $x_j(t)$, $j = 1, 2, 3$, following a Gaussian model:

$$dx_j(t) = -k_j x_j(t)dt + \sigma_j dW_j(t), \quad j = 1, 2, 3,$$

where:

- δ, k_j, σ_j , are constants for all the factors.
- $W_j(t)$, $j = 1, 2, 3$ are three Brownian motions (under the risk-neutral measure) which are dependent with each other, with instantaneous correlation coefficients ρ_{ij} , for $i, j = 1, 2, 3$.

2 Code Implementation

```
#ifndef _Affine3D_H
#define _Affine3D_H

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

#define TYPEMOD Affine3D

/*3D Affine World*/
typedef struct TYPEMOD
```

```
{  
  VAR T;  
  VAR x01;  
  VAR x02;  
  VAR x03;  
  VAR k1;  
  VAR k2;  
  VAR k3;  
  VAR Sigma1;  
  VAR Sigma2;  
  VAR Sigma3;  
  VAR shift;  
  VAR Rho12;  
  VAR Rho13;  
  VAR Rho23;  
} TYPEMOD;
```

```
#endif
```