Template | **fairmat**

Interest Rate *Floor* with *Knock-Out*

An Interest Rate *Floor* is (generally) an O.T.C. derivative contract based on a series of European interest rate put options. This interest rate sensitive instrument protects the floor buyer from losses resulting from a decrease in interest rates. The floor seller compensates the buyer with a payoff when the reference interest rate falls below the floor strike rate. In detail a knock-out option under a trigger clause is an option contract in which the option holder receives an option conditional on the underlying rate breaching a certain trigger level (also called barrier level).

1   Introduction

Interest Rate *Floor* with *Knock-Out*		
Principal	100 *bullet*	
Trade Date	23/03/2010	
Effective Date	25/03/2010	
Termination Date	25/03/2015	
Payment Frequency	*Quarterly*	
Payoff		
From Effective to Termination date	If *EUR Euribor 3M* < 2%	−
	If *EUR Euribor 3M* ≥ 2%	max(3% - *EUR Euribor 3M* ; 0%)
Conventions		
Reset dates	*Advance*, 2 days before	
Day Count Fraction	*Act*/360 (*Adjusted*)	

Table 1: *Example of an Interest Rate Floor with Knock-Out template.*

2   Template implementation

This section describes the constants, symbols and functions we used for the implementation of the template:

Interest Rate *Floor* with *Knock-Out* on *Fairmat*	
Principal	**N**
Trade Date	Trading date (simulation start date)
Effective Date	Contract initial date
Termination Date	**Pd**[end]
Payment Frequency	**matRate**-Year (exchange per year)
Payoff	
From 1 to length(@**Pd**) If **matRate**-Year Euribor < **strkout**	−
If **matRate**-Year Euribor ≥ **strkout**	max(**levStk*stk** - **levRate***matRate-Year Euribor ; 0%)
Conventions	
Reset dates	**Advance**, **rday** days before

Table 2: *Example of Interest Rate Floor with Knock-Out template described through Fairmat objects.*

The variables of Interest Rate *Floor* with *Knock-Out* template loaded on "*Parameters & Functions*" can be classified into three categories:

N	pdu
100.00	25/06/2010
100.00	25/09/2010
100.00	25/12/2010
100.00	25/03/2011
100.00	25/06/2011
100.00	25/09/2011
100.00	25/12/2011
100.00	25/03/2012
100.00	25/06/2012
100.00	25/09/2012
100.00	25/12/2012
100.00	25/03/2013
100.00	25/06/2013
100.00	25/09/2013
100.00	25/12/2013
100.00	25/03/2014
100.00	25/06/2014
100.00	25/09/2014
100.00	25/12/2014
100.00	25/03/2015

Table 3: *Input (Vectors) of Interest Rate Floor with Knock-Out template loaded on "Parameters & Functions" Fairmat enviroment.*

1. *Contract specific* parameters:

   - **N**: principal, bullet or amortizing (see Table 3);
   - **pdu**: payment date (unadjusted), used for auxiliary item **Pd** (see Table 3);

- **matRate**: time horizon of Floating rate expressed into year fraction;

- **levRate**: leverage on Floating rate;

- **levStk**: leverage on strike (**stk**) rate;

- **stk**: strike rate;

- **stkout**: strike beyond the *Floor* (or *floorlet*) does not pay *cashflow*;

- **rday**: number of days before *Initial* (*Advance*) / *Ending* (*Arrears*) period;

2. *Market* data:

- **zr**: *zero* rate (derived from *spot* rate);

3. *Auxiliary* and *Instrumental* variables: the following elements are other objects and functions that aren't input − they are derived from or depend on *Contract specific* data or *Market* data inputs − but they are useful for use within "*Option Map*" enviroment.

- **KnockOut1**: analytic function of a *floorlet* payoff with knock-out threshold;

- **Pd**: date's vector transformation from **pdu** vector (see Table 3);

- **Rd**: date's vector transformation from **pdu** vector (see Table 3) using **rday** constant;

- **Dur**: date's vector difference transformation from **pdu** vector (see Table 3);