Template | fairmat

Interest Rate *Collar CMS - CMS spread*

1 Introduction

An Interest Rate *Collar* is an instrument created to guarantee that the interest rate on the underlying floating rate always lies between a ceiling and a floor. It is a combination of a long position in a cap and a short position in a floor. In details the underlying of this Interest Rate *Cap* is a CMS rate or the differential between two CMS rates.

Interest Rate *Collar CMS - CMS spread*		
Principal	100 *bullet*	
Trade Date	28/06/2004	
Effective Date	30/06/2004	
Termination Date	30/06/2014	
Payment Frequency	*Quarterly*	
Payoff		
From the First to the Tenth year	If (*30-Year CMS - 2-Year CMS*) $\leq$ 0.25%	0.25% + 1.00%
	If 0.25% $<$ (*30-Year CMS - 2-Year CMS*) $\leq$ 3.00%	–
	If (*30-Year CMS - 2-Year CMS*) $>$ 3.00%	3.00% + 0.20%
Conventions		
Reset dates	*Arrears*, 2 days before	
Day Count Fraction	*Act*/360 (*Adjusted*)	

Table 1: *Example of an Interest Rate Collar CMS - CMS spread template.*

2 Template implementation

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

Interest Rate *Collar CMS - CMS spread* on *Fairmat*	
Principal	**N**
Trade Date	Trading date (simulation start date)
Effective Date	Contract initial date
Termination Date	**Pd**[end]
Payment Frequency	frequency of **Pd**
Payoff	

From 1 to length(@**Pd**)	If (**levCMS1*matCMS1**-Year CMS - **levCMS2*matCMS2**-Year CMS) $\leq$ (**levStkfloor*Stklow**) (**levStkfloor*Stklow**) + **sprlow**
	If (**levCMS1*matCMS1**-Year CMS - **levCMS2*matCMS2**-Year CMS) $\geq$ (**levStkcap*Stkhigh**) (**levStkcap*Stkhigh**) + **sprhigh**
	If (**levCMS1*matCMS1**-Year CMS - **levCMS2*matCMS2**-Year CMS) $>$ (**levStkcap*Stkhigh**)

Conventions	
Reset dates	**Arrears**, **rdays** days before
Day Count Fraction	**Dur**

Table 2: *Example of Interest Rate Collar CMS - CMS spread template described through Fairmat objects.*

The variables of Interest Rate *Collar* template loaded on "*Parameters & Functions*" can be classified into three categories:

pdu	N	Stklow	Stkhigh	sprlow	sprhigh
30/12/2004	100	0.25%	3.00%	1.00%	0.20%
30/06/2005	100	0.25%	3.00%	1.00%	0.20%
30/12/2005	100	0.25%	3.00%	1.00%	0.20%
30/06/2006	100	0.25%	3.00%	1.00%	0.20%
30/12/2006	100	0.25%	3.00%	1.00%	0.20%
30/06/2007	100	0.25%	3.00%	1.00%	0.20%
30/12/2007	100	0.25%	3.00%	1.00%	0.20%
30/06/2008	100	0.25%	3.00%	1.00%	0.20%
30/12/2008	100	0.25%	3.00%	1.00%	0.20%
30/06/2009	100	0.25%	3.00%	1.00%	0.20%
30/12/2009	100	0.25%	3.00%	1.00%	0.20%
30/06/2010	100	0.25%	3.00%	1.00%	0.20%
30/12/2010	100	0.25%	3.00%	1.00%	0.20%
30/06/2011	100	0.25%	3.00%	1.00%	0.20%
30/12/2011	100	0.25%	3.00%	1.00%	0.20%
30/06/2012	100	0.25%	3.00%	1.00%	0.20%
30/12/2012	100	0.25%	3.00%	1.00%	0.20%
30/06/2013	100	0.25%	3.00%	1.00%	0.20%
30/12/2013	100	0.25%	3.00%	1.00%	0.20%
30/06/2014	100	0.25%	3.00%	1.00%	0.20%

Table 3: *Input (Vectors) of Interest Rate Collar CMS - CMS spread 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);
   - **Stklow**: strike rate on floor (see Table 3);
   - **Stkhigh**: strike rate on cap (see Table 3);
   - **sprlow**: spread added to floor strike rate (see Table 3);
   - **sprhigh**: spread added to cap strike rate (see Table 3);
   - **levStkfloor**: leverage on strike (**Stklow**) rate;
   - **levStkcap**: leverage on strike (**Stkhigh**) rate;
   - **rday**: number of days before *Initial* (*Advance*) / *Ending* (*Arrears*) period;
   - **matCMS1**: time horizon of CMS rate n.1, expressed in years;
   - **matCMS2**: time horizon of CMS rate n.2, expressed in years;
   - **tenor1**: payment frequency of CMS rate n.1 (exchange per year);
   - **tenor2**: payment frequency of CMS rate n.2 (exchange per year);
   - **levCMS1**: leverage on CMS rate n.1;
   - **levCMS2**: leverage on CMS rate n.2;
   - **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.
   - **D**: computes the CMS spread (with leverage on CMS rates);
   - **Collar**: analytic function of a +*caplet* - *floorlet* payoff. It uses the **D** function;
   - **Caplet**: analytic function of a *caplet* payoff;
   - **Floorlet**: analytic function of a *floorlet* payoff;
   - **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).