

March 2012

CDS QUOTATIONS:

QUOTED SPREAD, UPFRONT FEES AND RUNNING SPREAD

Didier KOUOKAP YOUNBI

(didier.kouokap@gmail.com)

RECALL ON CDS PRICING

- For the sake of simplicity, we have neglected the accrued value in the Framework below. We focus here on the understanding of the different types of CDS quotations. For exact formulas within CDS pricing, one can read for instance *"Pricing of CDS, BOND and CDO, (With Stochastic (Krekel) and Constant Recovery Rate, by Didier KOUOKAP YOUUMBI"*

- **Floating Leg**

$$PV(\text{default leg}) = (1 - R)N \sum_{i=1}^n D(t, T_i)(S(t, T_{i-1}) - S(t, T_i))$$

- N is the notional
- R is the recovery rate
- D is the discount factor between the calculation date and the ith payment date
- S(t,T) is the probability at time t that the name has not yet defaulted at time T

- **Fixed Leg**

$$PV(\text{fixed leg}) = \text{spread} * N \sum_{i=1}^n \Delta T_i D(t, T_i) S(t, T_i)$$

- **Present Value of the CDS (when buyer of protection – the opposite if seller of protection)**

$$PV(\text{CDS}) = \text{Floating Leg} - \text{Fixed Leg}$$

$$= (1 - R)N \sum_{i=1}^n D(t, T_i)(S(t, T_{i-1}) - S(t, T_i)) - \text{spread} * N \sum_{i=1}^n \Delta T_i D(t, T_i) S(t, T_i)$$

CDS QUOTATIONS: 3 TYPES

■ Running spread quotation

- When the buyer of protection pays coupons frequently (typically 3 Months), the running spread is the spread that vanishes the present value of the CDS (at initiation):

$$Running_Spread(t, T) = \frac{(1 - R) \sum_{i=1}^n D(t, T_i) (S(t, T_{i-1}) - S(t, T_i))}{\sum_{i=1}^n \Delta T_i D(t, T_i) S(t, T_i)}$$

$$MtM(t, T) = N * (Running_Spread(t, T) - spread_Initiation) * Rbp(t, T)$$

$$Rbp(t, T) = \sum_{i=1}^n \Delta T_i D(t, T_i) S(t, T_i) \text{ is the risky duration ; And } \sum_{i=1}^n \Delta T_i = T - t$$

■ Up front value quotation

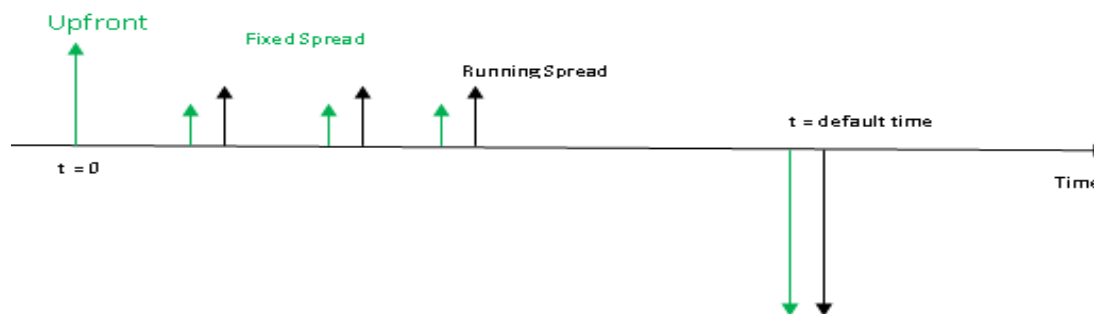
- With Running spread, neither the seller or buyer of protection hasn't to pay at initiation, since the swap is at par. So anyone could enter in a CDS contract, even if the operator doesn't have cash. To reduce speculation positions, CDS spreads are now quoted at fixed values: 100bps or 500bps (only one quotation is liquid for each name). And to set the CDS at par, one of the 2 counterparts should pay a cash value (at initiation) to the other counterpart. This cash is called the upfront value

$$Upfront(t, T) = (1 - R) \sum_{i=1}^n D(t, T_i) (S(t, T_{i-1}) - S(t, T_i)) - Fixed_Spread * Rbp(t, T)$$

$$MtM(t, T) = \begin{cases} 0, & t = 0 \\ N * Upfront(t, T), & t > 0 \end{cases}$$

■ Comparison between Running spread and Up front value

$$Upfront(t, T) = (Running_Spread(t, T) - Fixed_Spread) * Rbp(t, T)$$



CDS QUOTATIONS: 3 TYPES

■ Quoted spread quotation

- Still the Fixed spread (coupon) is set at a fixed value (100bps or 500bps);
- Still an upfront value is paid at initiation;
- The difference with the upfront quotation is that the survival probability, for a given maturity, is calculated using a single spread: the quoted spread. Each maturity ignores the spreads of shorter maturities. Said differently, for each maturity, the survival probability is computed using a flat (constant) hazard rate function from zero to the maturity

$$Quoted_Spread(t, T) = \frac{(1 - R) \sum_{i=1}^n D(t, T_i) (S^{quoted}(t, T_{i-1}) - S^{quoted}(t, T_i))}{\sum_{i=1}^n \Delta T_i D(t, T_i) S^{quoted}(t, T_i)}$$

$$Upfront(t, T) = (Quoted_Spread(t, T) - Fixed_Spread) * Rbp^{quoted}(t, T)$$

$$MtM(t, T) = \begin{cases} 0, & t = 0 \\ N * Upfront(t, T), & t > 0 \end{cases}$$

■ Converting quoted spread quotation into Upfront value quotation and vice versa

- In order to standardize this conversion, it is recommended that everyone uses the ISDA (International Swaps and Derivatives Association) CDS standard model, originally implemented by JP Morgan, and available on the following web site: <http://www.cdsmodel.com/cdsmodel/>

■ Converting Upfront Value quotation into Running Spread quotation and vice versa

- One can bootstrap survival probabilities from one quotation, and calculate the other quotation, using the bootstrapped probabilities

REFERENCES

- [1] Beumee J., Brigo D., Schiemert D., Stoye G.: 2009, Charting a Course Through the CDS Big Bang , *FitchSolutions, Quantitative Research*, September.
- [2] Kouokap Youmbi D.: 2012, Pricing of CDS, BOND and CDO (With Stochastic (Krekel) and Constant Recovery Rate), *Working Paper*.