

CDS 평가로직 설명서

1. Premium Leg

① Premium의 현재가치 (발생이자 제외)

$$\sum_1^N S \times \Delta(t_{n-1}, t_n) Z(0, t_n) Q(0, t_n)$$

S = CDS Spread

N = Number Of Premium Payments

Z = Discount Factor

Q = Survive Probability

② Premium Leg 발생이자의 현재가치

$$\sum_1^N \int_{t_{n-1}}^{t_n} S \times \Delta(t_{n-1}, u) Z(0, u) (-dQ(0, u)) \approx \sum_1^N S \times \frac{1}{2} \Delta(t_{n-1}, t_n) Z(0, t_n) (Q(0, t_{n-1}) - Q(t_n))$$

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③ Premium 현재가치(발생이자 포함)

$$\sum_1^N S \times \frac{1}{2} \Delta(t_{n-1}, t_n) Z(0, t_n) (Q(0, t_{n-1}) + Q(t_n))$$

2. Protection Leg

① Protection 현재가치

$$\begin{aligned} \hat{D}(0, T) &= (1 - R) \int_0^T Z(0, u) (-dQ(0, u)) \\ &\approx (1 - R) \sum_{k=1}^K \frac{1}{2} (Z(0, t_{k-1}) + Z(0, t_k)) (Q(0, t_{k-1}) - Q(0, t_k)) \end{aligned}$$

K = Number of Observation Period of Default

3. CDS Spread

$$V(0, T) = (1 - R) \sum_{k=1}^K \frac{1}{2} (Z(0, t_{k-1}) + Z(0, t_k)) (Q(0, t_{k-1}) - Q(0, t_k)) \\ - \sum_{n=1}^N S \times \frac{1}{2} \Delta(t_{n-1}, t_n) Z(0, t_n) (Q(0, t_{n-1}) + Q(0, t_n)) = 0$$

$$S(0, T) = \frac{(1 - R) \sum_{k=1}^K \frac{1}{2} (Z(0, t_{k-1}) + Z(0, t_k)) (Q(0, t_{k-1}) - Q(0, t_k))}{\sum_{n=1}^N \frac{1}{2} \Delta(t_{n-1}, t_n) Z(0, t_n) (Q(0, t_{n-1}) + Q(0, t_n))}$$

4. MtM Valuation

$$V(t, T) = (1 - R) \sum_{k=1}^K \frac{1}{2} (Z(t, t_{k-1}) + Z(t, t_k)) (Q(t, t_{k-1}) - Q(t, t_k)) \\ - \sum_{n=1}^N S_{\text{OLD}} \times \frac{1}{2} \Delta(t_{n-1}, t_n) Z(t, t_n) (Q(t, t_{n-1}) + Q(t, t_n))$$