Black Cap Floor 평가로직 설명서

1. Caplet, Floorlet

① **Caplet is a call option on forward LIBOR(SOFR) $\mathbf{f_t}(\boldsymbol{T}, \boldsymbol{T}+\boldsymbol{\Delta t})$ which becomes spot LIBOR(SOFR) at the maturity date T.**

$$\mathrm{c}(0) = \Delta t \times P(0, T+\Delta T)[f_0(T, T+\Delta t)N(d_1) - XN(d_2)]$$

$$\mathrm{N(y)} = \frac{1}{\sqrt{2\pi}}\int_{-\infty}^{y} e^{-\frac{z^2}{2}}dz$$

$$\mathrm{d_1} = \frac{\left(\ln\left(\frac{f_0(T, T+\Delta T)}{X}\right) + \frac{1}{2}v^2T\right)}{v\sqrt{T}} \ , \mathrm{d_2} = d_1 - v\sqrt{T}$$

② **Floorlet is put option on forward LIBOR(SOFR) $\mathbf{f_t}(\boldsymbol{T}, \boldsymbol{T}+\boldsymbol{\Delta t})$ which becomes spot LIBOR(SOFR) at the maturity date T.**

$$\mathrm{p}(0) = \Delta t \times P(0, T+\Delta T)[-f_0(T, T+\Delta t)N(-d_1) + XN(-d_2)]$$

2. Cap, Floor

① **Cap(Floor) is a portfolio of Caplet(Floorlet).**

② $\mathrm{C}(0) = \sum_{i=1}^{N} \Delta(T_{i-1}, T_i) \times P(0, T_i)[f_0(T_{i-1}, T_i)N(d_1) - XN(d_2)]$

③ $\mathrm{P}(0) = \sum_{i=1}^{N} \Delta(T_{i-1}, T_i) \times P(0, T_i)[-f_0(T_{i-1}, T_i)N(-d_1) + XN(-d_2)]$