

1. WCDR Analytic Formula

WCDR(Worst Case Default Rate)

$$\text{WCDR}(1y, \alpha, PD, \rho) = N \left(\frac{\left(N^{-1}(PD) + \sqrt{\rho} N^{-1}(1 - \alpha) \right)}{\sqrt{1 - \rho}} \right)$$

UnExpected Loss = $F \times \text{WCDR} \times \text{LGD}$

Expected Loss = $F \times PD \times \text{LGD}$

Risk Capital = $(\text{UEL} - \text{EL}) \times \text{Maturity}_{Adj}$

$$\beta = \left(0.11852 - 0.05478 \cdot \ln(PD) \right)^2$$

$$\text{Maturity}_{Adj} = \frac{1 + (R - 2.5) \times \beta}{1 - 1.5 \times \beta}$$