Inverse Wishart Degrees of Freedom

Standard Inverse Wishart

$X \sim W^{-1}(\Psi, df)$

$\mathbb{E}[X] = \frac{\Psi}{df-n-1}$

$Var(X_{i,i}) = \frac{2 \cdot {\Psi_{i,i}}^2}{(df-n-1)^2(df-n-3)}$

$CV(X_{i,i})^2 = \frac{Var(X_{i,i})}{\mathbb{E}[X_{i,i}]^2}$

$CV(X_{i,i})^2 = \frac{\frac{2 \cdot {\Psi_{i,i}}^2}{(df-n-1)^2(df-n-3)}}{\frac{{\Psi_{i,i}}^2}{(df-n-1)^2}}$

$CV(X_{i,i})^2 = \frac{2}{df-n-3}$

$df - n - 3 = 2 \cdot CV(X_{i,i})^{-2}$

$df = 2 \cdot CV(X_{i,i})^{-2} + n + 3$

Assuming NONMEM parameterizes the inverse Wishart as:

$\Omega \sim W^{-1}(df \cdot \Omega_{prior}, df)$

$\mathbb{E}[\Omega] = \frac{df \cdot \Omega_{prior}}{df-n-1}$

$\Omega_{prior} = \frac{df-n-1}{df} \cdot \mathbb{E}[\Omega]$