Confidence Interval for VaR estimates

- Assuming Normal Returns
  - $SE(\hat{\mu}) = \sigma\sqrt{\frac{1}{T}}$
  - $SE(\hat{\sigma}) = \sigma\sqrt{\frac{1}{2T}}$ (T large)
    - $\frac{(T-1)\widehat{\sigma^2}}{\sigma^2} \sim X^2(T-1) \xrightarrow{\text{T } large} \widehat{\sigma^2} \sim N\left(\sigma^2, \sigma^4 \frac{2}{T-1}\right)$

Confidence Interval for VaR estimates

- Under Non-Normality, use bootstrapping
  1. Resample from the simulated data using their empirical distribution; or run the simulation several times.
     - Resampling from the simulated data using their empirical distribution can be done in RSP.
  2. In each new sample (either from resampling or simulation), calculate VaR.
  3. Repeat steps 1 and 2 many times to get several VaR estimates; use these estimates to get the expected VaR and its confidence level.