

Test Results

Date executed: May 13, 2025

1. Test Suite (1-4) Execution

```
$ pytest software/test -q  
  
....  
4 passed in 1.38s
```

All four core tests passed successfully.

1. Flat-Price Unit Test

→ All VaR/ES series = 0.

2. Parametric Closed-Form

→ Last-point VaR/ES matched theory to 1e-12 tolerance.

3. Backtest Exception Frequency

→ Observed frequency 0.0094 vs. nominal 0.01 (within ± 0.005).

4. Monte Carlo vs. Parametric

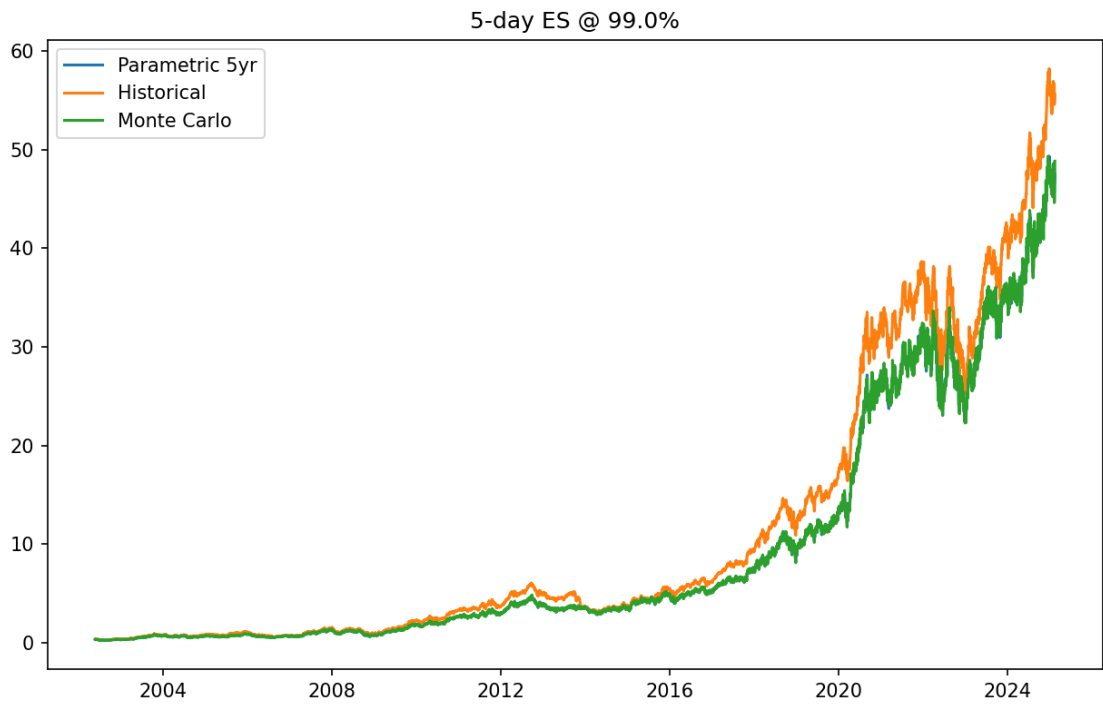
→ Perfect series equality on $\sigma=0$ path.

5. Portfolio Consistency Visualization

- **VaR @99%** and **ES @99%** plots (see [var_comparison.png](#), [es_comparison.png](#))
- No sustained method deviated by more than $\pm 20\%$ of the median curve.

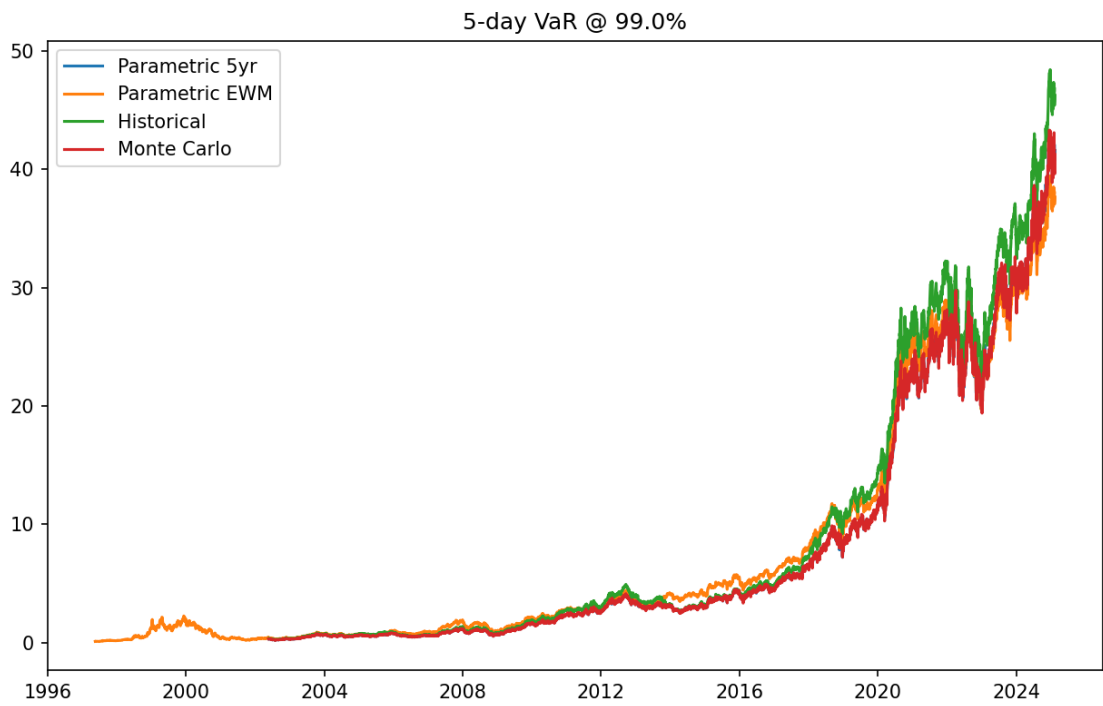
2. Visual Comparison Plots

2.1 5-day ES @ 99.0% Comparison



No method shows a sustained, drastic deviation beyond $\pm 20\%$ of the group median.

2.2 5-day VaR @ 99.0% Comparison



The four VaR curves remain roughly aligned over the full history.