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MARKOV SHADOW SIMULATION REPORT
Period: 2025-01-01 to 2025-01-31
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VOLATILITY ENERGY:
  Real Vol: 0.000501
  Sim Vol:  0.001320
  (Ratio: 2.64x)

TAIL RISK (CRASH CAPTURE):
  Real VaR (99%): -0.1046%
  Sim VaR (99%):  -0.3795%
  Real CVaR:      -0.1767%
  Sim CVaR:       -0.5411%

DISTRIBUTION & DRAWDOWN:
  Real Kurtosis: 297.64
  Sim Kurtosis:  14.23
  Real MDD: -4.03%
  Sim Avg MDD: -10.38%

HEALTH CHECK:
  Final Z-Score: -0.67
  KS Test P-Val: 0.0000

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APPENDIX: MODEL PARAMETERS
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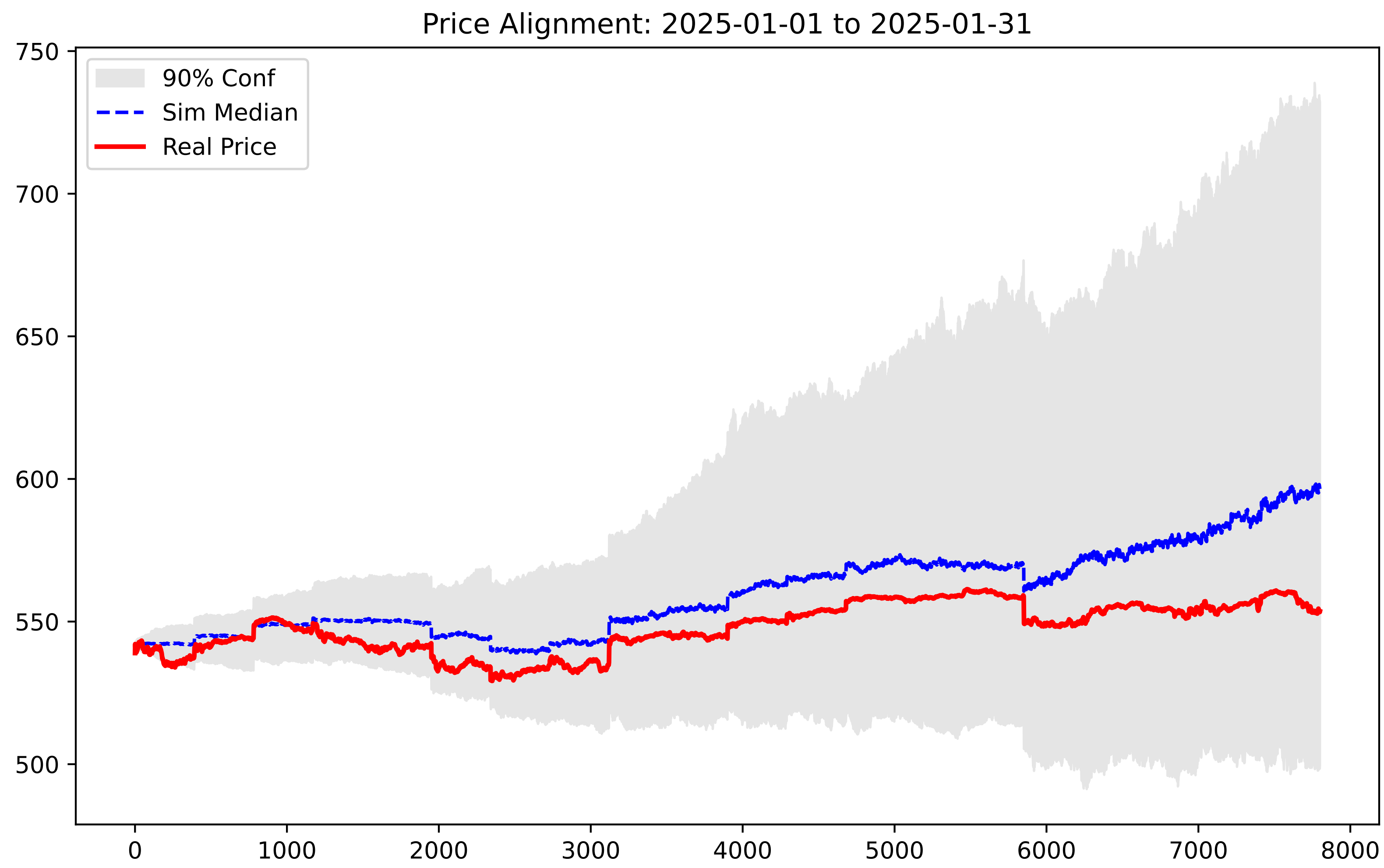
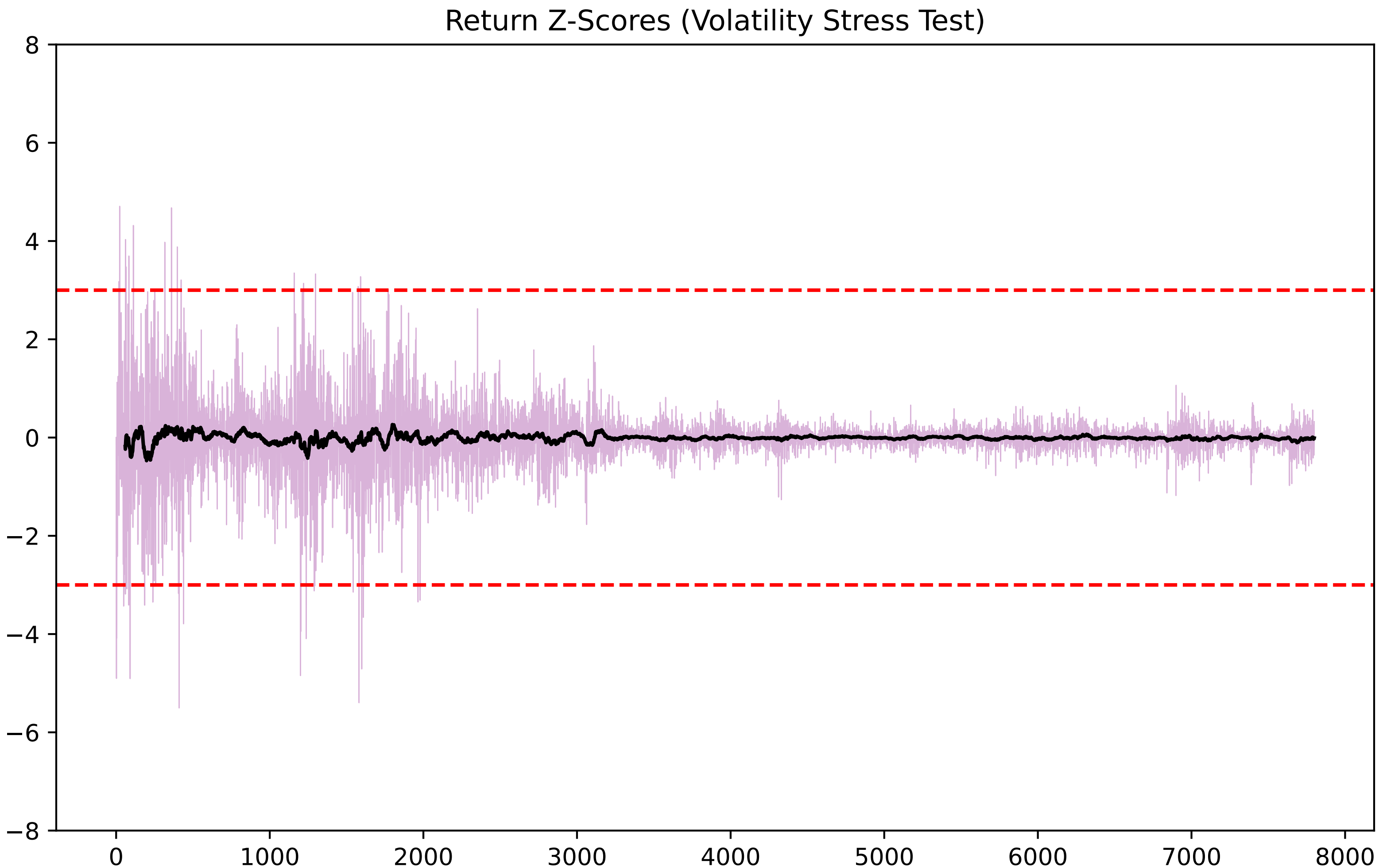
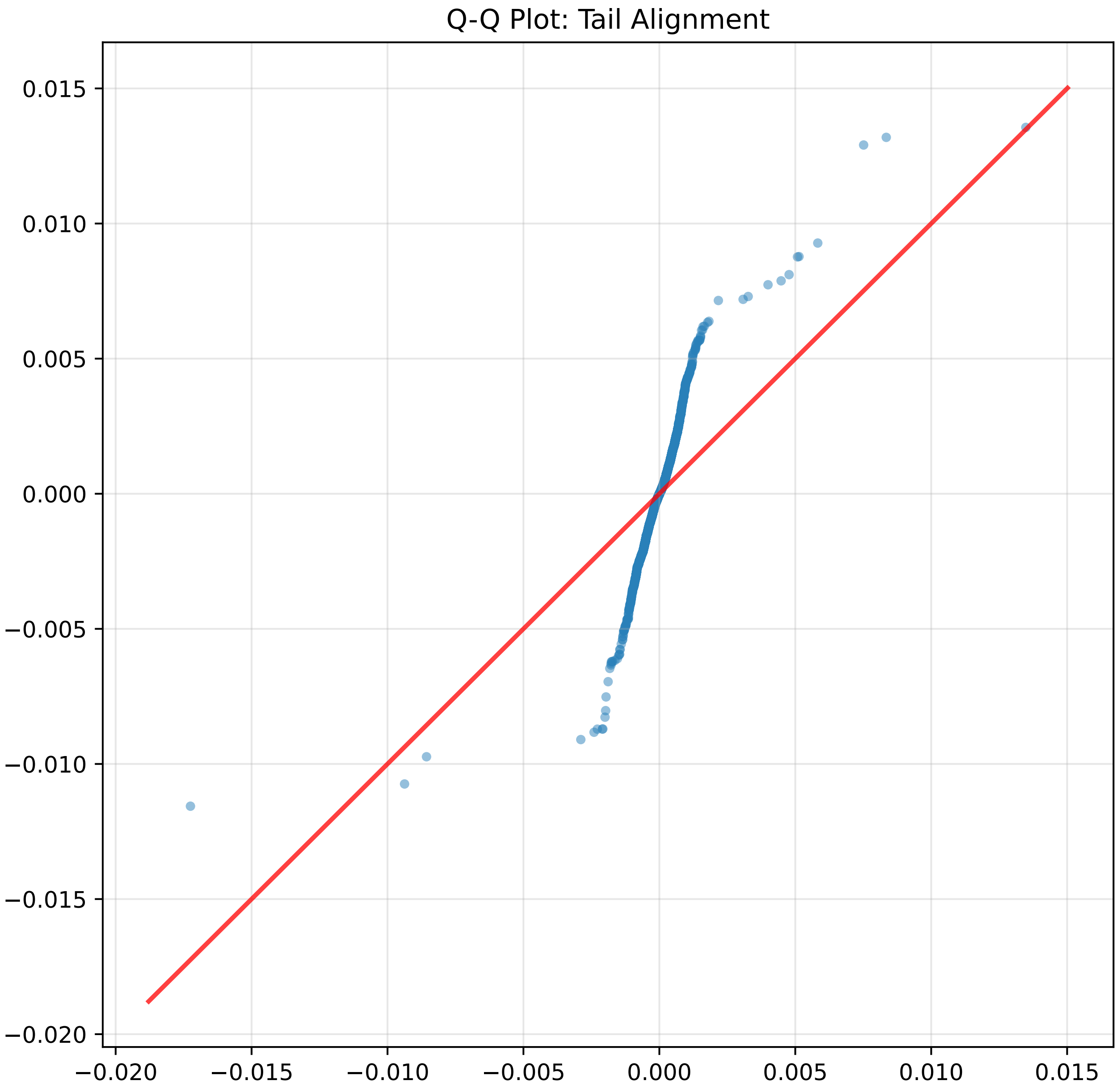
  Start Date: 2025-01-01
  End Date: 2025-01-31
  Lookback Years: 6
  N Days Simulated: 20
  EWMA Span: 390
  Threshold Low: 0.004
  Threshold High: 0.015
  Threshold Extreme: 0.025
  Jitter: 0.001
  Zero Threshold: 1e-05
  N Simulations: 200
```



Price Alignment: 2025-01-01 to 2025-01-31
90% Conf
Sim Median
Real Price
750
700
650
600
550
500
0
1000
2000
3000
4000
5000
6000
7000
8000


Return Z-Scores (Volatility Stress Test)
8
6
4
2
0
−2
−4
−6
−8
0
1000
2000
3000
4000
5000
6000
7000
8000


Q-Q Plot: Tail Alignment
0.015
0.010
0.005
0.000
−0.005
−0.010
−0.015
−0.020
−0.020
−0.015
−0.010
−0.005
0.000
0.005
0.010
0.015