

MARKOV SHADOW SIMULATION REPORT  
Period: 2025-02-20 to 2025-03-20

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VOLATILITY ENERGY:

Real Vol: 0.000627  
Sim Vol: 0.001198  
(Ratio: 1.91x)

TAIL RISK (CRASH CAPTURE):

Real VaR (99%): -0.1495%  
Sim VaR (99%): -0.3670%  
Real CVaR: -0.2368%  
Sim CVaR: -0.5285%

DISTRIBUTION & DRAWDOWN:

Real Kurtosis: 72.28  
Sim Kurtosis: 15.96  
Real MDD: -10.56%  
Sim Avg MDD: -10.83%

HEALTH CHECK:

Final Z-Score: -1.07  
KS Test P-Val: 0.0000

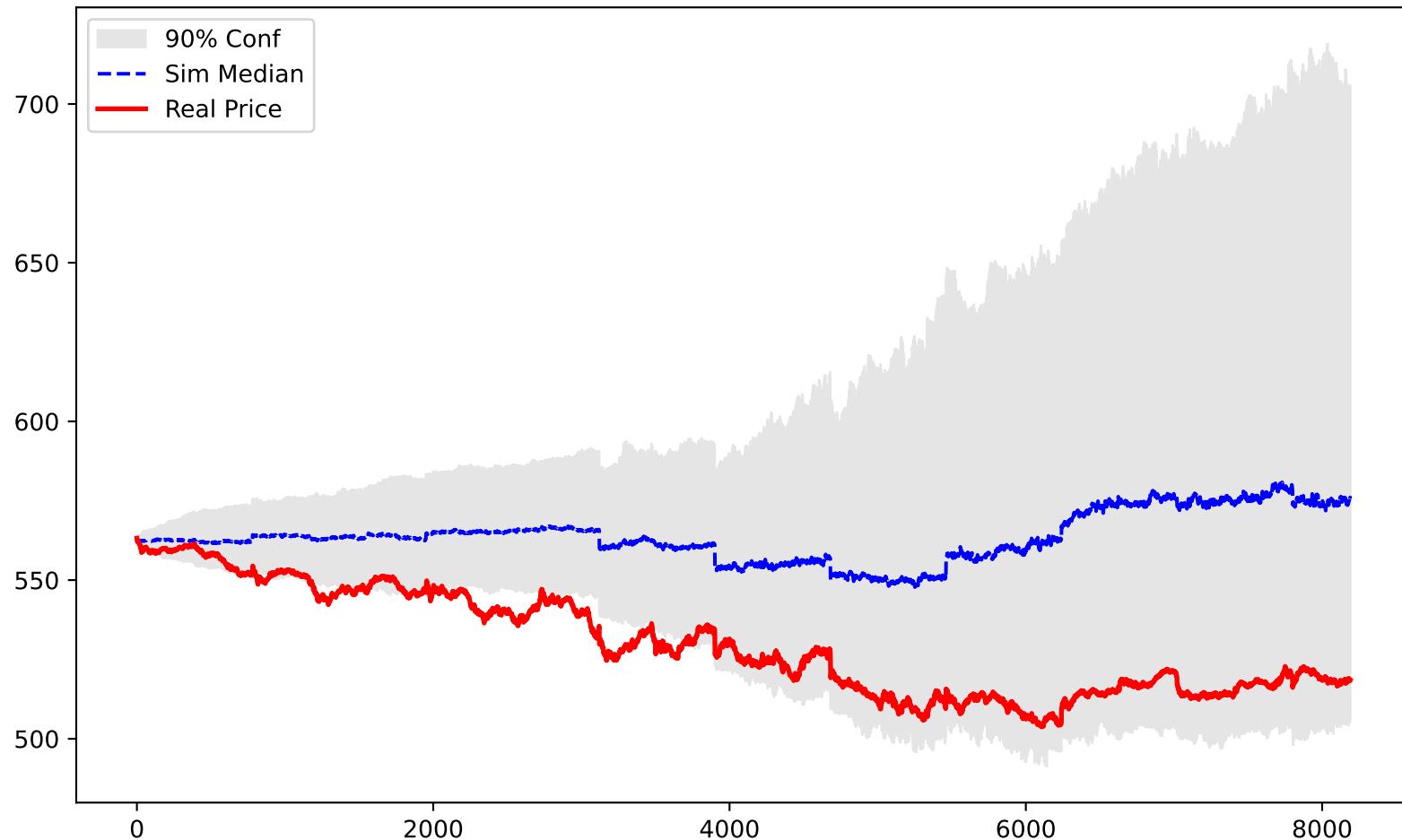
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APPENDIX: MODEL PARAMETERS

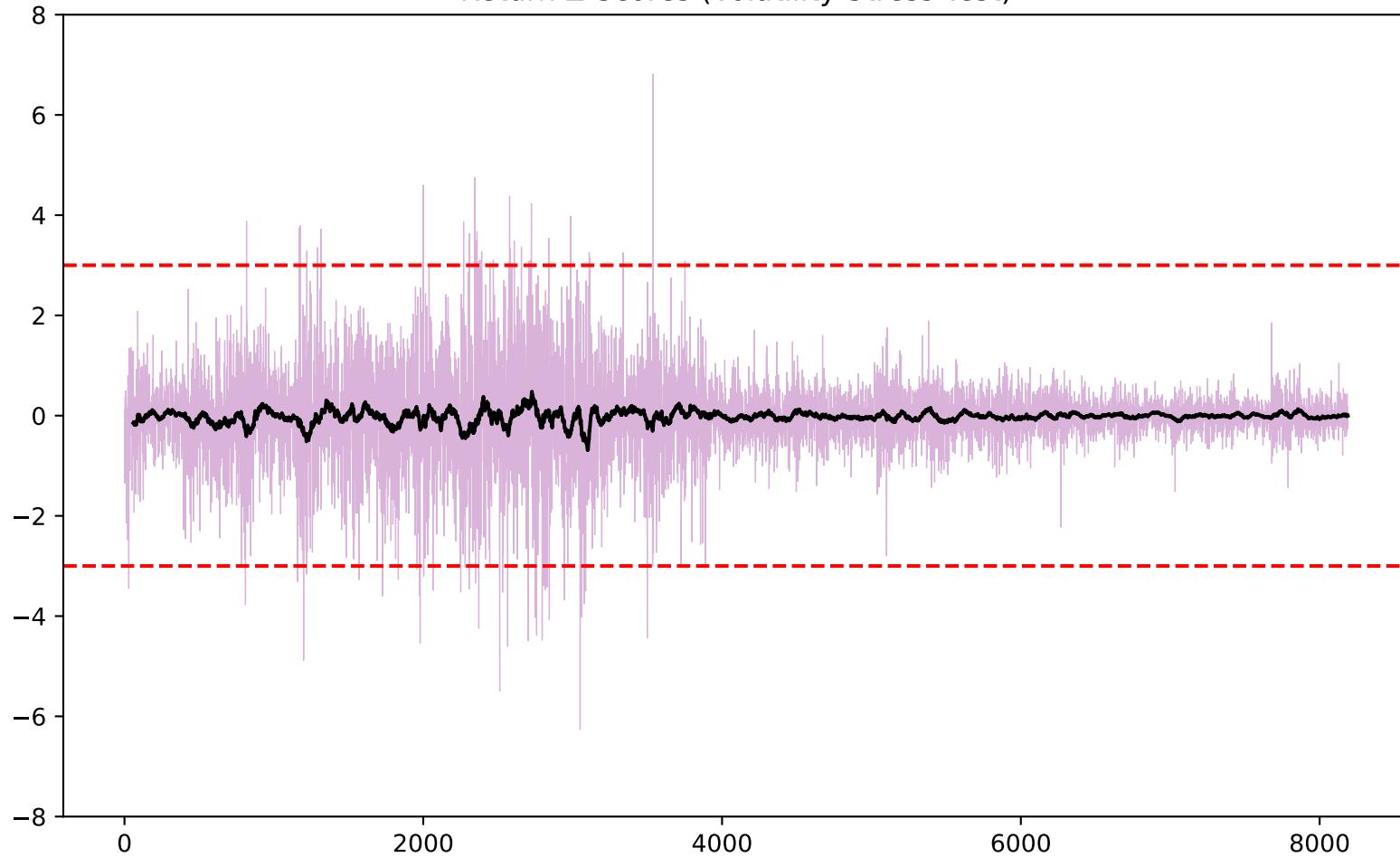
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Start Date: 2025-02-20  
End Date: 2025-03-20  
Lookback Years: 6  
N Days Simulated: 21  
EWMA Span: 390  
Threshold Low: 0.004  
Threshold High: 0.015  
Threshold Extreme: 0.025  
Jitter: 0.001  
Zero Threshold: 1e-05  
N Simulations: 200

Price Alignment: 2025-02-20 to 2025-03-20



### Return Z-Scores (Volatility Stress Test)



Q-Q Plot: Tail Alignment

