

# GARCH Volatility Forecasting Report – ^GSPC

Period analyzed: 1y | Model: GARCH(1,1) | Forecast horizon: 7 trading days

## 1. Objective

Forecast short-term stock return volatility using a GARCH(p,q) model and provide clear visuals for upcoming risk. Where possible, evaluate forecast quality against a simple EWMA(0.94) benchmark using QLIKE loss (lower is better).

## 2. Data

Data source: Yahoo Finance (adjusted close). Returns are daily log returns expressed in percent. Volatility figures shown are daily standard deviations in percent.

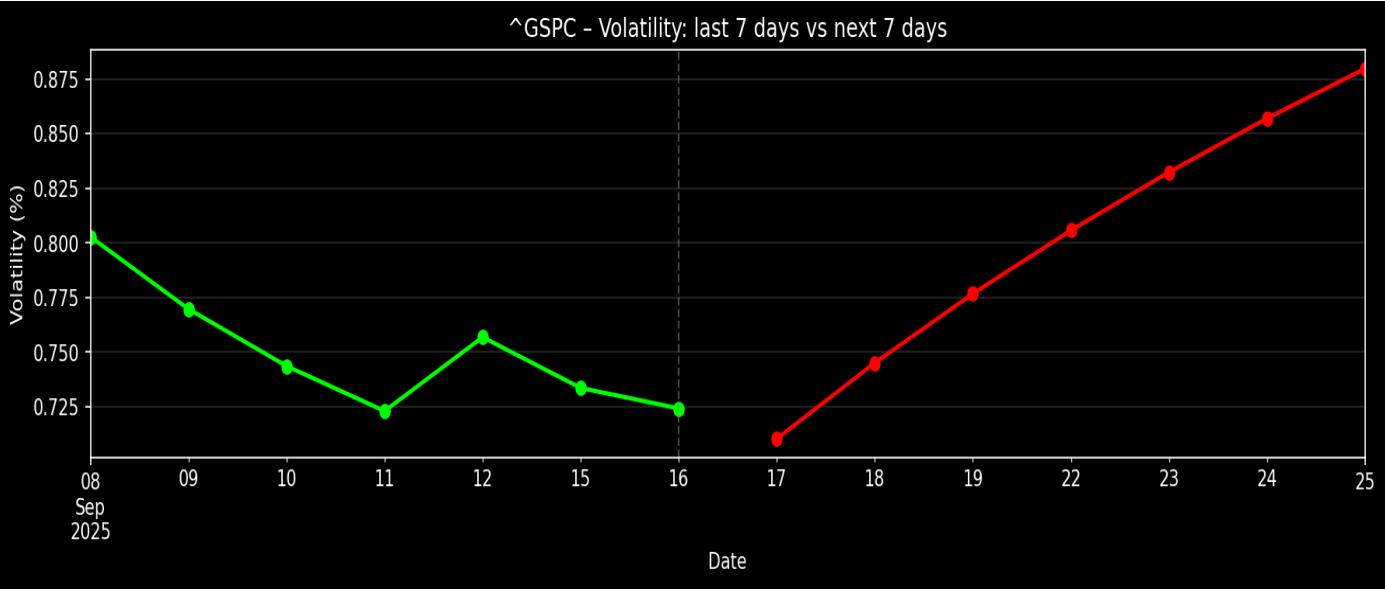
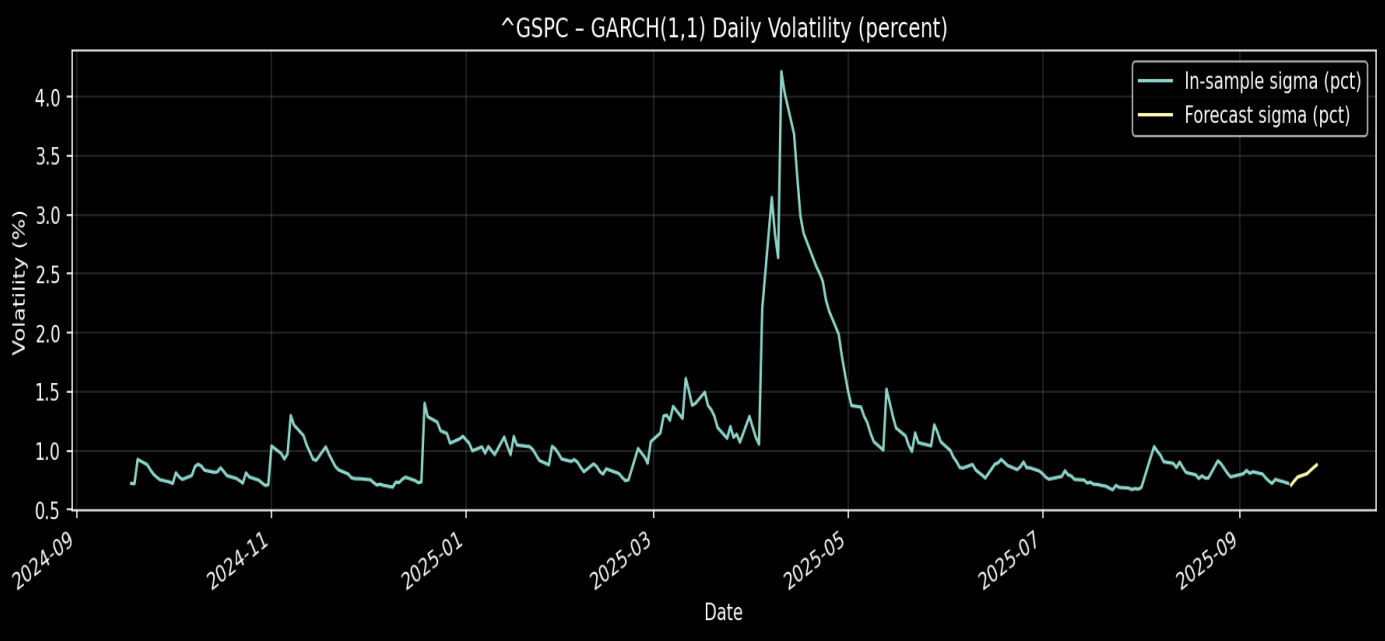
## 3. Model Selection

Model orders (p,q) guided by ACF/PACF diagnostics of (squared) returns and BIC search. Chosen specification: GARCH(1,1).

## 4. Forecasts

Date	In-sample daily vol (%)
2025-09-10	0.744%
2025-09-11	0.723%
2025-09-12	0.757%
2025-09-15	0.734%
2025-09-16	0.724%

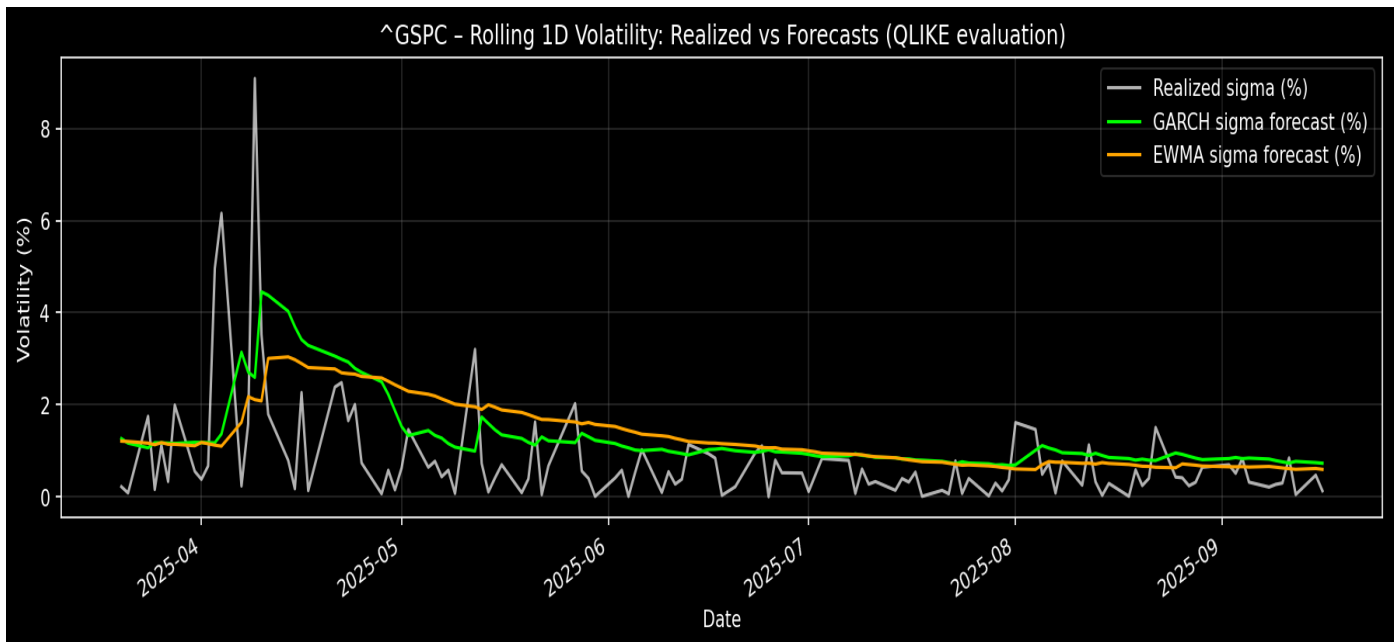
Date	Forecast daily vol (%)
2025-09-17	0.710%
2025-09-18	0.745%
2025-09-19	0.777%
2025-09-22	0.806%
2025-09-23	0.832%
2025-09-24	0.857%
2025-09-25	0.880%



5. Backtest (1-day ahead, QLIKE)

Rolling re-fit with 1-day-ahead variance forecasts. Benchmark: EWMA(0.94). Evaluation metric: QLIKE

Metric	GARCH	EWMA(0.94)
Average QLIKE	-8.008172	-7.839862



## 6. Takeaways

Predicted volatility (next days): 2025-09-17: 0.710%; 2025-09-18: 0.745%; 2025-09-19: 0.777%.

GARCH outperformed EWMA on QLIKE (-8.008172 vs -7.839862).

GARCH provides time-varying daily volatility estimates useful for risk sizing, derivatives, and portfolio optimisation. Forecasts are in daily %; results depend on asset and lookback window.