

## Day 7: Stylized Facts Report v1

Are both stylized facts present?

Yes, present.

The log-returns time series shows long stretches of small returns followed by bursts of large fluctuations, rather than constant amplitude noise.

The ACF of absolute returns is strongly positive at short lags and decays slowly over time. This indicates that large moves tend to be followed by larger moves and calm periods follow calm periods.

Returns themselves are not autocorrelated, but volatility is, which matches real financial markets.

Volatility is state dependent and persistent, violating IID Gaussian assumptions which is a core stylized fact.

### Fat Tails (Leptokurtosis)

Also, present.

The return histogram is sharply peaked around zero with long, heavy tails.

When compared against a Gaussian with the same mean and variance, one, the Gaussian severely underestimates tail probability, two, extreme returns occur far more often in the simulation than under normal assumptions.

The empirical kurtosis = 9.93 (approx.), which is well above the Gaussian benchmark of 3 and demonstrates strong evidence of leptokurtic (fat-tailed) behavior.

The market generates extreme events endogenously, without exogenous shocks.

If not, what agent interaction is missing?

Not applicable.