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**Title**: "Does the Term-Structure of the At-the-Money Skew Really Follow a Power Law?"

**Abstract**

Using two years of S&P 500, Eurostoxx 50, and DAX data (2020-2021), we empirically investigate the term-structure of the at-the-money-forward (ATM) skew of equity indexes. While a 2 power law (2 parameters) captures the term-structure well away from short maturities, the power law fit deteriorates considerably when short maturities are included. By contrast, 3-parameter shapes that look like power laws but do not blow up at vanishing maturity, such as time-shifted power laws (TSPL), are shown to fit well regardless of whether short maturities are included or not.

Our study suggests that the term-structure of equity ATM skew has a power-law shape for maturities above 1 month but has a different behavior, and in particular may not blow up, for shorter maturities. The 3-parameter shapes are derived from non-Markovian variance curve models using the Bergomi-Guyon expansion. A simple 4-parameter term-structure similarly derived from the (Markovian) two-factor Bergomi model is also considered and provides even better fits. The extrapolated zero-maturity skew, far

from being infinite, is distributed around a typical value of 1.5 (in absolute value). Our analysis thus shows that in order to accurately capture the whole termstructure of ATM skew one should use classical Markovian two-factor stochastic volatility models or (more parsimonious but non-Markovian) TSPL models rather than rough volatility models. This is joint work with Mehdi El Amrani.