

# Empirics of financial multifractality

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The financial dynamics is a multiscale phenomenon and therefore the question which of its properties are scale invariant and which are scale characteristic refers to the essence of this phenomenon. There exists strong evidence that at least a large portion of the financial dynamics is governed by phenomena analogous to criticality in the statistical physics sense. Multifractality constitutes the most significant related financial stylized fact. Multifractal Detrended Fluctuation Analysis (MF-DFA) method provides the most practical and reliable framework to quantify such characteristics.

In the present contribution, based on a properly adopted variant of MF-DFA, using the time series representing the price changes and the inter-transaction time intervals on various financial markets as well as several types of artificially generated series, we provide arguments demonstrating that the financial multifractality originates exclusively from the long-range nonlinear temporal correlations. Contrary to the frequent claims the leptokurtic tails in the return distributions do not contribute to the width of the multifractal spectrum since in the real markets they are Levy unstable. This is an effect analogous to the Central Limit Theorem and can be seen only for sufficiently long time series.

We also show that not all of the financial series develop multifractal scaling. For instance, price changes of the smaller stock market companies are typically associated with fluctuations that do not respect a correspondingly consistent hierarchical organization. This however can be considered an encouraging observation because it provides further arguments in favor of the multifractal spectrum as a highly informative measure of correlations.