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Investigating the interplay between excess kurtosis and tail events in financial contexts

Abstract
The well established “fat tail issue” of financial returns is routinely supported by high values of the conventional kurtosis statistic (see e.g. Fiori and Zenga [2]). Based on fourth powers of the observations, the measure is however unable to discriminate between heavy tailed distributions as d.g.p. or simply the presence of a few extremes in the sample (Kim and White [4], Bonato [1]). For this reason, we suggest alternative measures of right and left kurtosis which are less sensitive to outlying observations and are consistent with common risk perceptions of investors and risk managers (Fiori [3]). Using the theory of L-statistics, we construct consistent estimators of the new measures in the i.i.d. case and prove their asymptotic normality under broad based assumptions on the underlying distribution. While the sampling variance of the conventional kurtosis coefficient is related to the population moment of order eight, the new measures can be appropriately estimated under the milder requirement that second moments are finite. In addition to an explicit formula for the asymptotic variance, we estimate the latter by bootstrap techniques and design extensive Monte Carlo simulations to compare the traditional kurtosis measure with its right and left counterparts in finite samples.

For purposes of financial applications, the interplay of kurtosis and clustering in the volatility dynamics needs to be considered. Consequently, we first fit ARMA-GARCH models to several series of daily stock market returns by QML techniques. Right and left kurtosis measures are then estimated on standardized residuals. While the stylized facts about excess kurtosis in financial series may have been accepted too readily, the new measures are likely to provide a deeper insight into the interplay between peakedness, tail events and right/left excess kurtosis in market data.