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The limiting extremal behaviour of speculative returns: an analysis of intra-daily data from the Frankfurt Stock Exchange

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Abstract

This paper provides a statistical analysis of high-frequency recordings of the German share price index DAX. The data set extends from November 1988 to the end of the year 1995 and includes all minute-to-minute changes during trading hours at the Frankfurt Stock Exchange. The focus of this study is on the limiting behaviour characterizing the tail regions of the empirical distribution. Application of the popular Hill estimator for the tail shape yields results very similar to those of other analyses of speculative returns. However, since the reliability of tail index estimation rests on the appropriateness of the tail regions, the question of optimally choosing the sample fraction emerges. Exploiting recent advances in extreme value theory a couple of novel approaches are applied for determining the optimum cut-off value for the ‘tail’ of the empirical distribution. As it turns out, most algorithms suggest that one has to go out

quite far into the tails for estimation of the extremal index. The findings obtained at the highest frequency (minute-to-minute returns) are confirmed when considering data at various levels of time-aggregation. A test for stability of extreme value behaviour over time gives no clear indication of changes of the limiting distribution. It is also illustrated how the approximation of the tails can be used to estimate the likelihood of large returns.