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Original Articles

Extreme dependence in the NASDAQ and S&P 500 composite indexes

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moment dependence in the two markets produce similar results, the same is not true in the extremes: we find significantly more extreme dependence in the NASDAQ returns. More generally, the study of extreme dependence may reveal contrasts which are obscured when examining the conditional second moment.

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Notes

¹ Extreme events are defined with respect to each market, as the largest negative (or positive) returns on that market.

² Note that the asymptotic dependence of the extremes of the two series is not the same across markets.

³ Another way to see this is that the asymptotic dependence of the extremes of the two series is not the same across markets. In particular, the asymptotic dependence of the extremes of the two series is not the same across markets. In particular, the asymptotic dependence of the extremes of the two series is not the same across markets.

⁴ The asymptotic dependence of the extremes of the two series is not the same across markets. In particular, the asymptotic dependence of the extremes of the two series is not the same across markets. In particular, the asymptotic dependence of the extremes of the two series is not the same across markets.

⁵ The asymptotic dependence of the extremes of the two series is not the same across markets. In particular, the asymptotic dependence of the extremes of the two series is not the same across markets. In particular, the asymptotic dependence of the extremes of the two series is not the same across markets.



indicate that such estimators are under investigation. Ferro and Segers ([2003](#)) suggest a bootstrap procedure for inference on α or β .

⁵ Note that if we were to choose a common numerical threshold instead, the higher variance of returns on the NASDAQ would imply a greater total number of exceedances, guaranteeing that the blocks method would show a greater mean cluster size for that market, since the number of blocks is the same for each market.

⁶ We do not present here results on the tail indices of the two markets. However, a variety of different estimates, and statistical inference using the test of Loretan and Phillips ([1994](#)), show no discernible difference in the two tail indices.

⁷ An estimated two-sided p-value of zero implies that no bootstrap replication of the processes yielded a statistic, T , as low as the hypothesized value.

⁸ The analysis in Longin ([2000](#)) also suggests that ignoring dependence in the data leads to underestimating the VaR, but concludes that the impact of dependence is not statistically significant at the daily frequency, and that the measures of dependence are smaller again at lower frequencies, for the sample that Longin considered (S&P 500 from January 1962 to December 1993). We have already concluded that there is significant extreme dependence in both asset returns and that the dependence is significant at lower frequencies in the NASDAQ series. This difference in the dependence results in part from the different sample frequencies used. The dependence measures for the daily S&P 500 are smaller than those for the daily NASDAQ series. The dependence in the neighborhood of the threshold is also smaller (again, Fig. 1(a)).



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