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Multifractal detrended cross-correlation analysis of carbon emission allowance and stock returns

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Abstract: The nonlinear relationship between carbon emission allowance and stock markets has attracted special attention from economists around the world. This paper uses the technique of multifractal detrended cross-correlation analysis (MF-DCCA) to investigate the cross-correlations between carbon emission allowance and stock series as well as their dynamics for European and Chinese markets, respectively. The results show that the cross-correlations between carbon and stock series are significantly multifractal in European and Chinese markets. The cross-correlations of small fluctuations are persistent while those of large fluctuations are anti-persistent. Moreover, the degree and width of multifractality is found to be stronger in China than in Europe. We confirm that the multifractality of cross-correlations could be attributed to both the persistence of fluctuations of carbon emission allowance and stock markets and fat-tail distributions of the time series. By employing rolling estimate of MF-DCCA, we find that the scaling exponent varies over time and across fluctuations in European and Chinese markets. In particular, the Hurst exponent fluctuates around 0.5 in recent years.

Keywords: Carbon emission allowance; Stock markets; Multifractal detrended cross-correlation analysis

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