



# Renyi's information transfer between financial time series

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In this paper we quantify the statistical coherence between financial time series by means of Renyi's entropy. With the help of Cambell's coding theorem we show that Renyi's entropy selectively emphasizes only certain sectors of the underlying empirical distribution while strongly suppresses others. This accentuation is controlled with Renyi's parameter  $q$ . To tackle the issue of the information flow between time series we formulate the concept of Renyi's transfer entropy as a measure of information that is transferred only between certain parts of underlying distributions. This is particularly pertinent in financial time series where the knowledge of marginal events such as spikes or sudden jumps is of a crucial importance. We apply the Renyian information flow to stock market time series from 11 world stock indices as sampled at a daily rate in the time period 02.01.1990 - 31.12.2009. Corresponding heat maps and net information flows are represented graphically. A detailed discussion of the transfer entropy between DAX and S&P500 indices based on minute tick data gathered in the period from 02.04.2008 to 11.09.2009 is also provided. Our analysis shows that the bivariate information flow between world markets is strongly asymmetric with a distinct information surplus flowing from the Asia-Pacific region both to Europe and the U.S. markets. Important, yet less dramatic excess of information also flows from Europe to the U.S. This is particularly clearly seen from a careful analysis of Renyi information flow between DAX and S&P500.

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