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Cross-corelations of financial crisis analysed by power law classification scheme. Evolving network analysis on the linear threshold.

The analysis of cross-correlations among the main world stocks market indexes is performed i.e. between: DAX (Frankfurt), FTSE100 (London), HSI (Honkong), Nikkei 225 (Tokyo), S&P500 (New York), SBF250 (Paris), STI (Singapur). The time series consist of daily records of the considered indexes from 01.01.1993 till 01.02.2014. In the paper the following daily values were used: the normalise range (i.e. difference between high and low divided by close index value) and the index return. The analysis is performed using power law classification scheme (PLCS) defined in [1]. The main advantage of PLCS is that it allows to classify and measure correlation strength. In order to observe the changes caused by financial crisis the moving time window technique was used with time window length T=50, 100 trading days. The time window was moved along the time axis by one day and the analysis performed for every time window.

Firstly the averaged correlation strength between stokes indexes were investigated. It was found that the picks of the mean and standard deviation plots of the correlation strength matrix are strictly related to the financial crises. What is more, the development and prosperity periods are characterised by negative value of correlation strength while in the crises the mean strength of correlation is greater than zero. In the view of this observation a work hypothesis can be taken that correlation strength close to zero is the threshold between crisis (instability of the system) and the development periods. The evolution of network structure was analysed. The networks were constructed assuming that the link between indexes exists if the correlation strength is smaller than zero. The roles of the analysed stocks markets are investigated, and the key network parameters i.e. node degree distribution and degree centrality calculated.

Summary: The PLCS provides very clear description of crises. It allows to compare crises depth and the relationship between global market participants.

[1]   J. Miśkiewicz, Physica A 392, 2150 (2013).