

The use of dynamical networks to detect the hierarchical organization of financial market sectors

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In this talk, we will show results concerning dynamical filtered correlated networks, in particular Minimum Spanning Trees (MSTs) and Planar Maximally Filtered Graphs (PMFGs) generated dynamically from correlations computed over a moving window of sizes between 1 and 12 months for daily time series of 300 most capitalized NYSE stocks in the time period from 2001 to 2003 [1-5]. Both hierarchical and topological properties of these graphs are studied in relation to markets fluctuations. The dynamical PMFG preserves the same hierarchical structure as the dynamical MST, providing also a more significant and richer structure, a stronger robustness and dynamical stability in the long range. The computation and analysis of different quantities such as Degree, Betweenness, Eccentricity and Closeness give indication on the topological position of each stock in these graphs providing a clear differentiation of stocks in terms of centrality and peripherality. In particular we find stocks well connected and central; stocks well connected but at the same time peripheral; stocks poorly connected but central; stocks poorly connected and peripheral. The Financial Sector plays a central role in the entire system whereas the other sectors are sharing the peripheral regions. The robustness, stability and persistence of these results are also checked by changing the time window, by performing the computations on different time periods and confirmed by a principal component analysis. We will discuss these results and the economic meaning of this hierarchical positioning.

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