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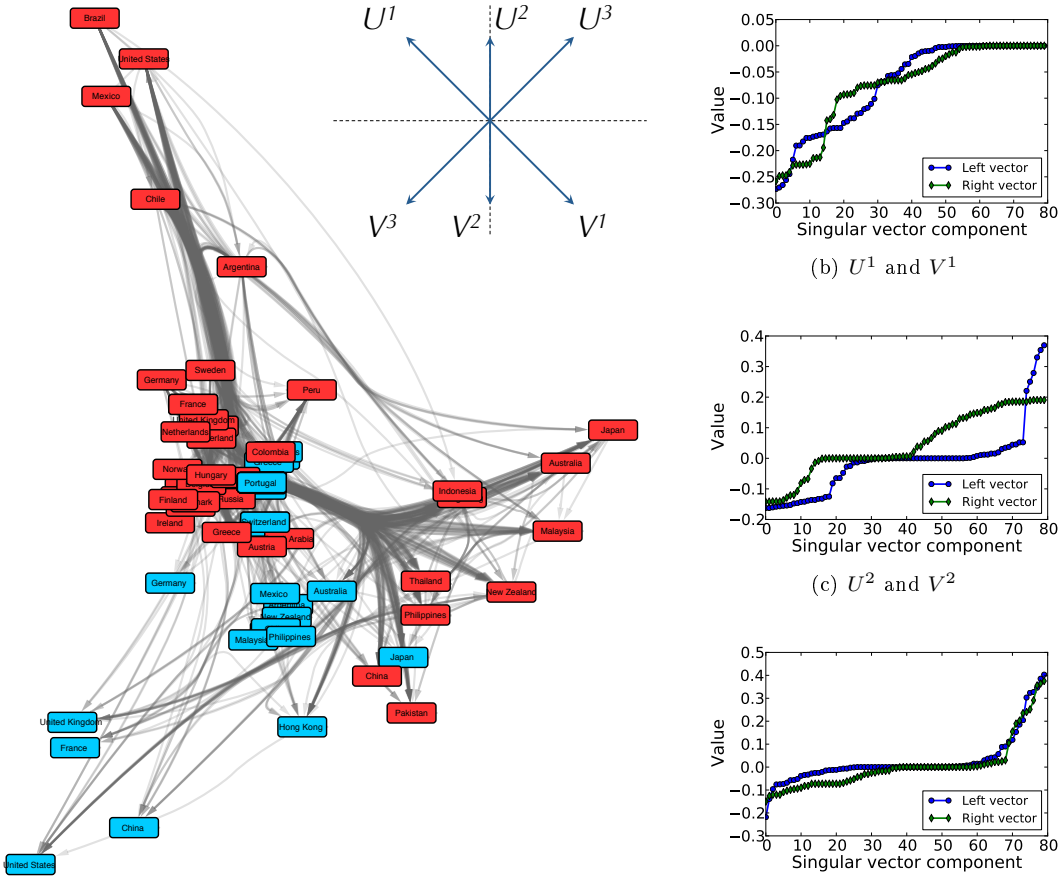
Coupled network approach to predictability of financial market returns and news sentiments

ABSTRACT: In financial economics, a central problem is to understand the mutual influences that financial news and market activity exert upon each other. Technological advances have enabled the quantification of financial news sentiments at an unprecedented granularity, allowing for the study of large-scale information flows among global news outlets and financial markets. Here, we analyze the network structure of both synchronous and lagged correlations among daily financial news sentiments and market returns of 40 countries. We make use of spectral methods to decompose the lagged correlation network into sub-structures that are approximately bipartite, and show numerically that these sub-structures are relevant to the performance of prediction models, bridging concepts from network theory and time series analysis. Our results suggest that, at the daily level, endogenous influences among financial markets overwhelm exogenous influences of news outlets, and that changes in financial news sentiments respond to market movements more substantially than they drive them.



(a) Complete directed network

(b) U^1 and V^1

(c) U^2 and V^2

(d) U^3 and V^3

Fig. 0.1. (a) Display of the directed lagged correlation-based network, showing links among markets (red) and news sentiment signals (blue). Nodes are arranged according to their entries in singular vectors of the adjacency matrix. In (b), (c), and (d) we plot the sorted components of the first three pairs of left- and right-singular vectors. For each vector, the largest entries in magnitude tend to be of the same sign. We find that the directed flow emanates from the Western markets before proceeding to the East Asian markets. These groups then collectively anticipate fluctuations in news sentiments.