Use of sparse correlations for assessing financial markets

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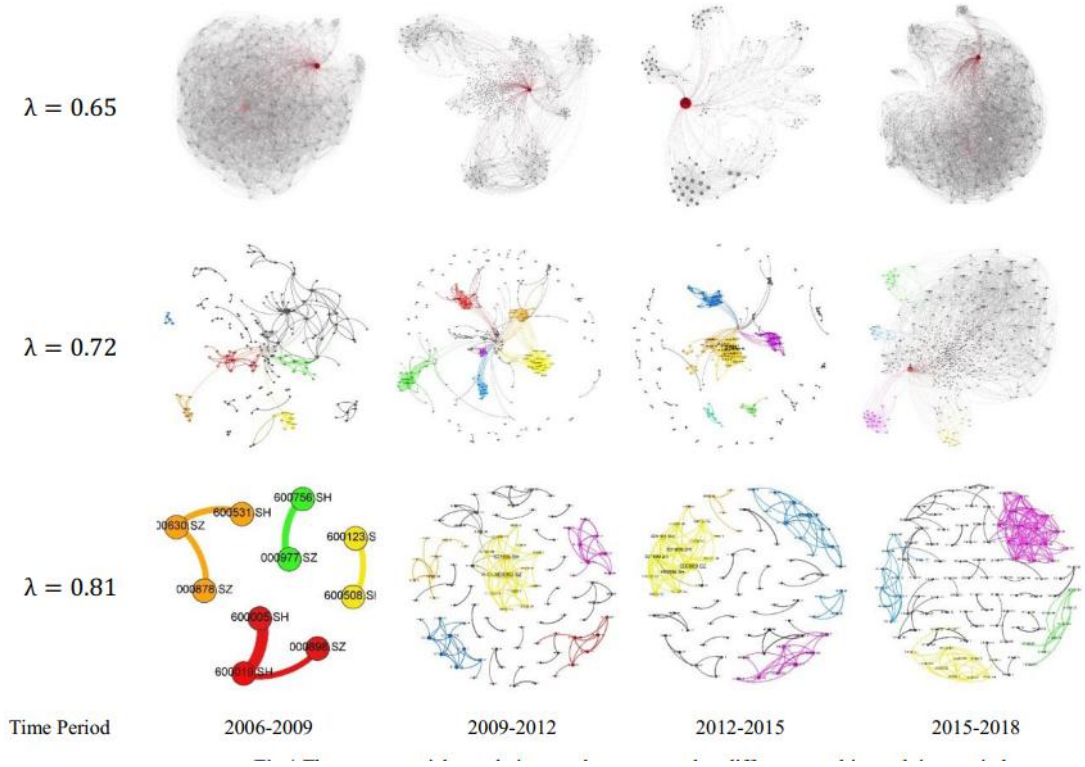
Problems & Ideas

- Problems of partial correlation in financial markets
  - Many of studies focus on traditional statistical methods, which solve the partial correlation of stocks with a large number of observation samples and a relatively small number of stocks.

- Ideas: infer the partial correlation graph between large numbers of stocks with relatively few samples based on Sparse Inverse Covariance Estimation.
  - The correlations between stocks usually change over time, especially in markets with high volatility. With this method, we can capture the changes of partial correlation between stocks in a larger scope.
  - We attempt to make a relatively comprehensive correlation analysis of all the China's A-share stocks for the first time.
  - By adjusting the penalty coefficient, it is convenient to infer partial correlation graphs with different sparsity levels, which helps to find important information and provide recommendations for stock industry classification and pairs trading.

Main Contributions

- The sparse partial correlation graphs correspond to different penalties and time periods



- The ratio of the same industry by traditional statistical method (denoted by TS) and Sparse Inverse Covariance Estimation (SICE)

Time	$\lambda = 0.65$		$\lambda = 0.72$		$\lambda = 0.81$	
Period	TS	SICE	TS	SICE	TS	SICE
06-09	0.2530	**0.2923**	0.5719	**0.6432**	0.8889	**1**
09-12	0.7477	**0.7798**	0.8985	**0.9010**	0.9326	**0.9485**
12-15	0.8022	**0.8068**	0.8575	**0.8661**	0.9321	**0.9466**
15-18	0.2697	**0.3051**	0.4763	**0.4920**	**0.9694**	0.9684